Patent In Suit (DX 2)

April 2, 1968 H. G. McCARTY ETAL 3,375,643

HARVESTING DEVICE

Filed Oct. 14, 1964

4 Sheets-Sheet 1

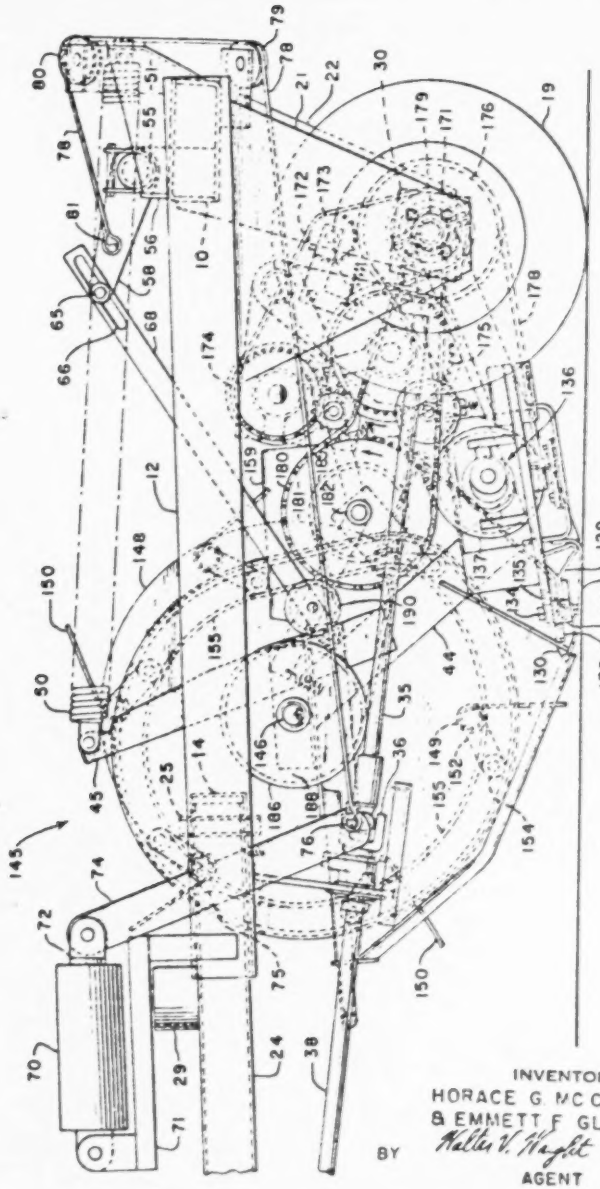

Fig. 1.

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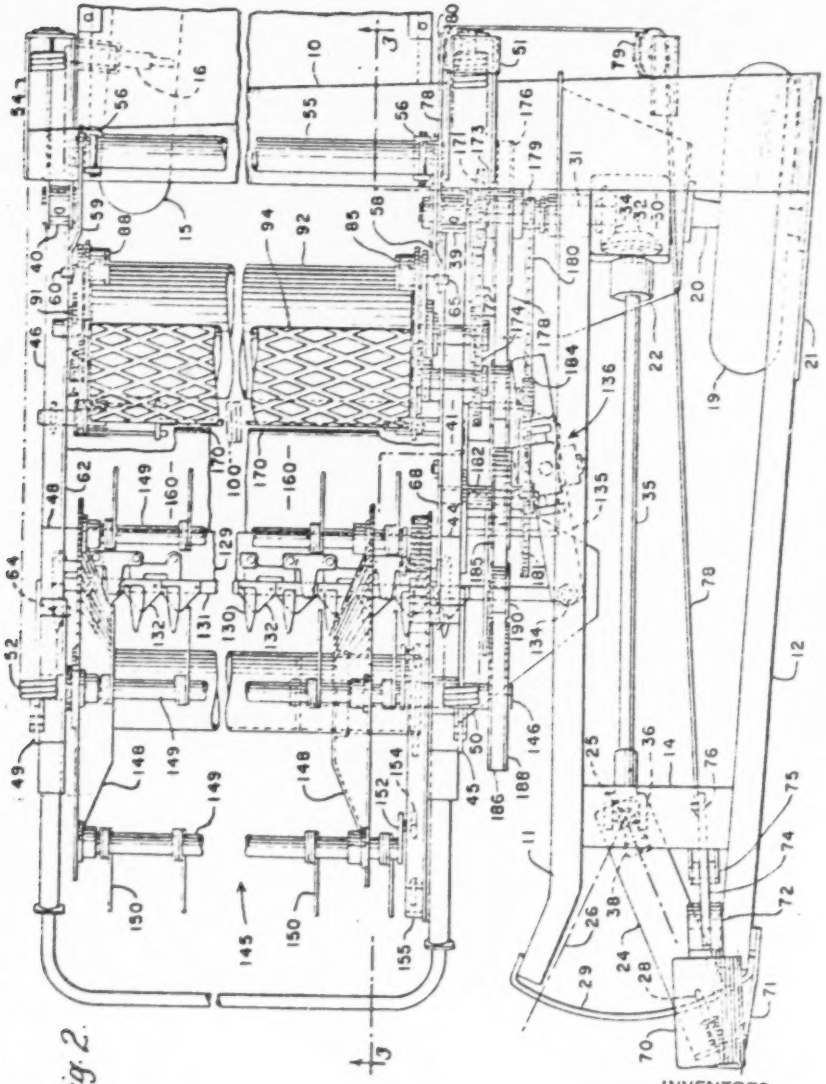

Fig. 2.

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Fig. 3

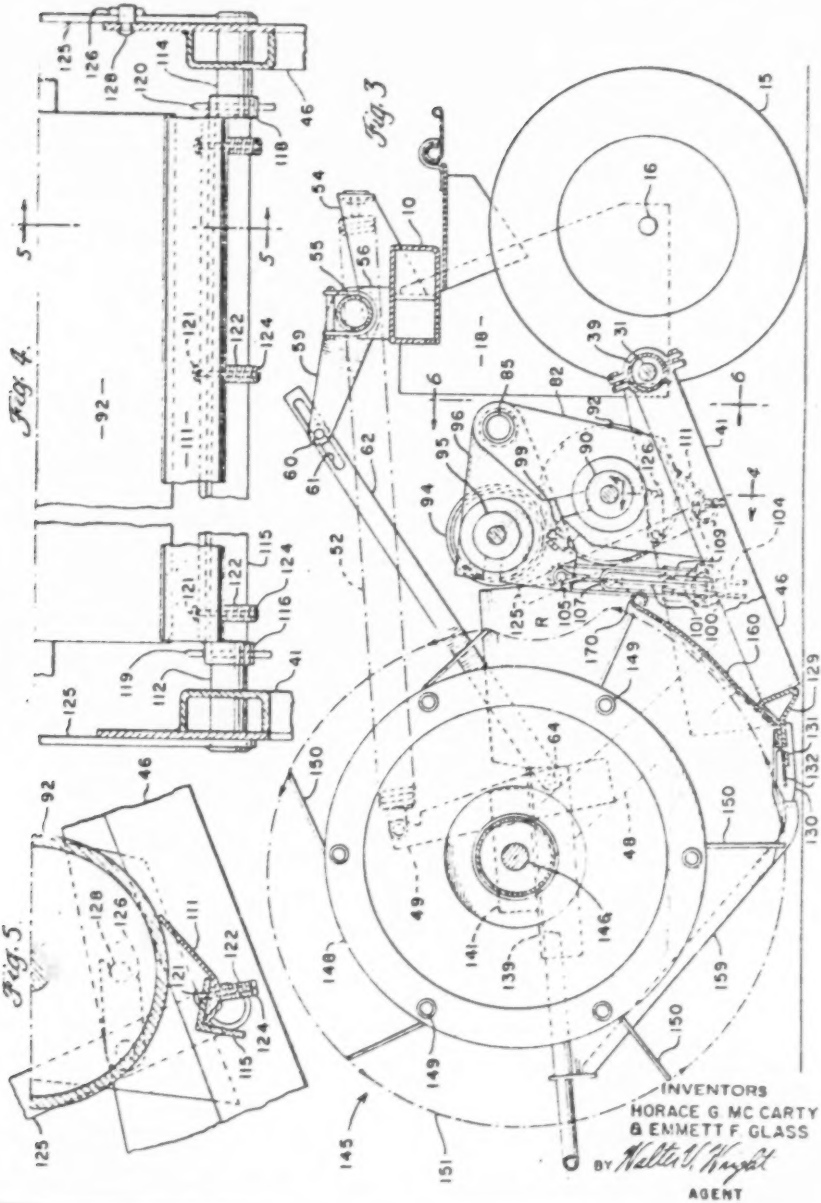

Fig. 4

Fig. 5

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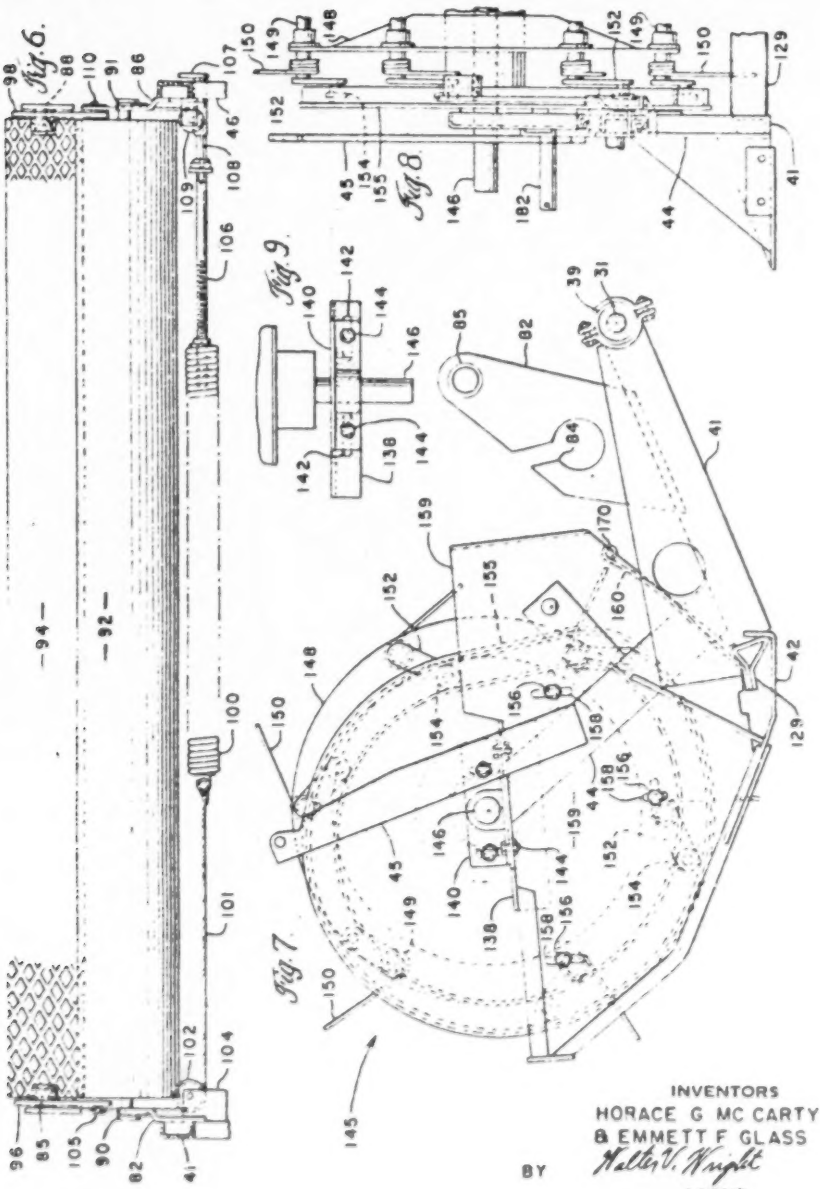

Patent In Suit (DX 2)

United States Patent Office

3,375,643

Patented Apr. 2, 1968

3,375,643

HARVESTING DEVICE

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Filed Oct. 14, 1964, Ser. No. 403,855
27 Claims. (Cl. 56—23)

This invention relates to equipment for harvesting hay or the like.

In hay harvesting operations, it is customary to condition crop material for drying after it is mowed and before is formed into windrows. The conditioning operation consists of passing the crop material between a pair of rolls which crack the stems to facilitate the escape of moisture. The best time to condition crop material is immediately upon mowing, before any wilting occurs. It is common practice to tow a conditioning implement behind a tractor on which is mounted a laterally projecting mower. With this arrangement, while a given swath of material is mowed, the previously mowed swath is conditioned. While this combination produces satisfactory results in small fields, as the field size increases so does the time lag between mowing and conditioning. With the present trend toward larger fields, crop wilting sometimes occurs between consecutive passes of the tractor. The more a crop is handled, the greater is the percentage of crop leaf loss in the field. This combination of implements picks up and drops the crop twice in performing the mowing and conditioning operations.

Attempts have been made in the past to combine mowing and conditioning mechanism in a single field machine. These machines spaced the conditioner rolls a substantial distance rearwardly of the mower and provided a floor or ramp to guide crop material from the mower to the conditioner. One such machine employed an endless belt conveyor. The speed and capacity obtainable by these early developments is inadequate by today's standards.

In recent years machines known as windrowers or swathers have become popular. These machines mow a wide swath of crop material, then consolidate the swath into a relatively thick narrow windrow. Some of these machines then pass the windrow between conditioning rolls. This compromises the quality of the conditioning operation in favor of speed and high capacity. The cracking effect of the conditioning rolls on the stems of the crop material cannot be as effective on a relatively thick mat of material as on a thin layer of the same material.

It is an object of this invention to provide hay harvesting mechanism for mowing a swath of crop material and immediately conditioning the mown swath.

It is another object of this invention to provide a device for mowing and conditioning hay with minimum field losses.

It is another object of this invention to provide a hay mowing and conditioning device capable of high capacity and high speed operation without plugging or jamming.

It is another object of this invention to provide a hay mowing and conditioning device capable of accommodating a wide range of crops and crop conditions, and wherein any necessary adjustments are quickly and easily performed.

It is another object of this invention to provide a hay mowing and conditioning device wherein the crop material is raked from the mower and positively fed into gripping relation with the conditioner rolls.

It is another object of this invention to co-relate in a single hay harvesting machine a mower, a reel and a pair of conditioning rolls in such a manner as to improve the effectiveness of each element beyond its individual capability.

These and other objects and advantages of this invention will be apparent upon reference to the following description and claims taken in conjunction with the accompanying drawings wherein:

FIG. 1 is a side elevational view of a hay harvesting machine constructed in accordance with the principles of the present invention;

FIG. 2 is a plan view of the machine shown in FIG. 1 with the central portion of the machine broken out to condense the figure;

FIG. 3 is an irregular sectional view taken on the line 3—3 of FIG. 2;

FIG. 4 is an enlarged fragmentary sectional view taken on the line 4—4 of FIG. 3;

FIG. 5 is an enlarged sectional view taken on the line 5—5 of FIG. 4;

FIG. 6 is a fragmentary view of the machine looking as indicated by the arrows 6—6 in FIG. 3;

FIG. 7 is a fragmentary elevational view of the reel similar to FIG. 3 showing the reel cam and adjusting slots;

FIG. 8 is a fragmentary elevational view of the mechanism of FIG. 7 as seen when looking from right to left in FIG. 7; and

FIG. 9 is a fragmentary plan view of the reel shaft journal means.

Referring now to the drawings, in detail, particularly FIGS. 2 and 1, the hay harvesting device of the present invention has a right angular base, or main, frame structure best seen in FIG. 2. A main frame member 10 extends transversely across the width of the device at the rear thereof. The machine is adapted to travel from right to left as it is seen in FIGS. 1 and 2. At the left side of frame member 10 a frame section comprising a pair of main frame members 11 and 12 projects forwardly and are interconnected near their front ends by a cross frame member 14. At the right side of frame member 10 a ground wheel 15 is journalled on a spindle 16 which is carried by frame plates 18 (see FIG. 3) depending from main frame member 10. At the left side of frame member 10 a ground wheel 19 is journalled on a spindle 20 which is carried by, and extends between, vertical frame plates 21 and 22 which are fixedly attached to, and depend from, frame members 10, 11 and 12. As may be seen in FIG. 2, the wheel spindles 16 and 20 may be canted relative to the direction of travel of the frame. A draw bar, or tongue, 24 extends forwardly from frame members 11 and 12 and is adapted to be connected in a conventional manner to a towing vehicle. The canting of the wheel spindles 16 and 20 creates a lateral drag opposite to that created by the laterally offset location of the draft tongue thereby providing substantially neutral handling characteristics in spite of the laterally offset tongue position. Tongue 24 is pivotally anchored to cross frame member 14 by a vertical pivot member 25 for lateral swinging movement between the operative position shown in FIG. 2 in solid lines and a road transport position indicated by the broken center line 26 in FIG. 2. The tongue may be latched in either position by a spring loaded pin 28 which projects through one of a series of holes (not shown) in a latch plate 29 carried by frame members 11 and 12.

A gearbox 30 is disposed just inboard of left ground wheel 19. Gearbox 30 has a transversely extending output shaft 31 which constitutes the main drive shaft of the machine. Bevel gears 32 and 34 supply driving power to shaft 31 from a forwardly extending shaft 35. Shaft 35 has a universal joint 36 disposed under tongue pivot member 25. A forward extension 38 from universal joint 36

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is adapted to be connected to the power-take-off system of the towing vehicle.

Depending from frame member 10 coaxial with drive shaft 31 is a transversely disposed journal 39 (see FIG. 3). Coaxial with journal 39 but at the extreme right side of frame member 10 a similar journal 40 is disposed. A sub-frame structure is pivotally carried by journals 39 and 40 and extends forwardly therefrom. Referring primarily to FIG. 7, a main sub-frame member 41 extends downwardly and forwardly from journal 39 and carries a ground skid member 42 at its forward end. Just rearwardly of skid 42 a sub frame member 44 extends upwardly and forwardly from member 41. Just above the midpoint of frame member 44 a rigid sub-frame member 45 extends upwardly at a slightly steeper angle. A sub-frame member 46 (FIGS. 2 and 3) substantially identical to member 41, extends downwardly and forwardly from journal 40 at the right side of the machine. A member 48 (FIG. 3) similar to member 44, extends upwardly and forwardly from frame member 46 at the right side of the machine. A member 49, substantially identical to member 45, is carried by member 48. A long fore and-aft extending spring 50 has its forwardmost end pivotally connected to sub-frame member 45 as may be seen in FIGS. 1 and 2, for example. The rearmost end of spring 50 is anchored to a bracket 51 carried by, and standing upwardly from, main frame member 10. A similar spring 52 and anchoring bracket 54 are provided at the right side of the machine. The front end of spring 52 connects to sub frame member 49. The springs 50 and 52 counterbalance the weight of the sub-frame structure and all the elements hereafter described which are carried thereby. The sub-frame is therefore free to float relative to the ground about mounting journals 39 and 40 in a substantially weightless manner.

In FIGS. 1 and 2 it may be seen that a rigid tube 55 overlies main frame member 10 within the transverse limits of the sub-frame structure. Tube member 55 has its ends journalled in brackets 56 mounted atop frame member 10. A forwardly extending lift arm 58 is rigidly carried by tube 55 at the left end thereof. An identical lift arm 59 is carried by tube 55 at the extreme right end thereof. As best seen in FIG. 3, the forward end of arm 59 carries a pin 60 slidably received in a slot 61 formed in the rear end of a downwardly and forwardly extending lift link 62. The forwardmost end of link 62 is pivotally connected at 63 to the right side of the sub-frame structure. An identical pin, slot and lift link 65, 66 and 68, respectively, are provided at the left side of the sub-frame structure. The pin and slot connections allow the sub-frame to float and follow the contours of the ground within the limits of the slots 61 and 66. Clockwise movement of tube 55 and lift arms 58 and 59 moves the pins 60 and 65 to the rear ends of slots 61 and 66 after which further clockwise movement of the lift arms and tube raises the sub-frame away from the ground about mounting journals 39 and 40. In order to raise lift arms 58 and 59, a hydraulic cylinder 70 (FIG. 1) is rigidly mounted by a bracket 71 to main frame member 12 at the front of the machine. Flexible couplings (not shown) are provided on cylinder 70 by which the cylinder may be operatively connected to the hydraulic system of a towing vehicle. The cylinder piston member 72 is pivotally connected to one end of a lever 74. As is best seen in FIG. 2, the midpoint of lever 74 is pivotally connected at 75 to a bracket disposed between main frame members 11 and 12 and rigidly carried by transverse main frame member 14. The other, or lower, end of lever 74 is pin connected at 76 to a flexible cable 78. Cable 78 extends rearwardly from lever 74 to and around a pair of pulleys 79 and 80 at the rear of the machine and then forwardly to left lift arm 58. A pin 81 connects cable 78 to left lift arm 58. Under the control of the operator of the towing vehicle, the piston member 72 of hydraulic cylinder 70 may be moved rearwardly as seen in FIG. 1. This pivots lever 74 about its pivot member 75 to swing the bottom end of

lever 74 forwardly, thereby pulling cable 78 forwardly. This swings the lift arms 58 and 59 and their mounting tube 55 clockwise (FIG. 1) to the end of lost motion slots 66 and 61 and thereafter lifts the sub-frame structure through links 62 and 68.

In FIG. 7 it may be seen that a vertical plate 82 stands upwardly from left side sub-frame member 41. The plate 82 has an inverted keyhole shaped opening 84 formed therein and carries a journal 85 at its uppermost end. An identical plate 86 (see FIG. 6) stands upwardly from right side sub-frame member 46 and carries a journal 88 at its uppermost end. Plate 86 is provided with an inverted keyhole-shaped opening identical to the opening 84 in plate 82. Referring jointly to FIGS. 3 and 6 it may be seen that bearings 90 and 91 are carried, respectively, in the keyhole-shaped slots in plates 82 and 86. A crop conditioner roll 92 has left and right end stub shafts journalled in the bearings 90 and 91, respectively. An upper crop conditioning roll 94 has its ends journalled in bearings, as indicated at 95 in FIG. 3, carried by left and right side plates 96 and 98 which are respectively pivotally mounted on journals 85 and 88 of upstanding plates 82 and 86. In this manner the upper conditioning roll 94 is mounted for vertical swinging movement away from and back toward lower conditioning roll 92. In FIG. 3 it may be seen that the axis, or shaft, of upper roll 94 is disposed forwardly of the shaft of lower roll 92 and that the diameter of lower roll 92 is larger than that of upper roll 94. Roll 92 is a smooth surfaced steel roll while upper roll 94 is provided with an aggressive tread-like surface as may be seen in FIGS. 2 and 6. The upper roll 94 may preferably be a rubber roll or a rubber coated steel roll. Adjustable screw type stop members 99 (FIG. 3) may be provided between the plates 96 and 82 and 98 and 86 to limit the extent of downward movement of upper roll 94 toward lower roll 92. Upper conditioner roll 94 is spring biased downwardly toward lower conditioner roll 92 by a transversely extending coil spring 100 (FIG. 6). A cable 101 extends from the left end of spring 100 to and around a pulley 102 which is carried by a bracket 104 mounted on the sub-frame side member 41. From pulley 102, cable 101 extends upwardly and is pin connected at 105 to the upper roll mounting plate 96 (see FIG. 3). A threaded rod 106 (FIG. 6) is carried by spring 100 at the right end thereof. Rod 106 is journalled on right side sub-frame member 46 and carries a crank handle 107, a portion of which is visible in FIG. 6. A cable 108 has its ends anchored on rod 106, as may be seen in FIG. 6. Only one end is visible, the other end being behind rod 106. Cable 108 extends from one end around a double pulley 109, whose mounting bracket is carried by sub-frame side member 46, and then upwardly to and around a pulley 110 on upper roll right side mounting plate 98 and then back down around double pulley 109 to its other anchored end. The biasing force on upper conditioning roll 94 is adjusted by turning crank handle 107 (see FIG. 3) to rotate rod 106 thereby preloading spring 100.

In phantom lines in FIG. 3 it may be seen that a scraper blade 111 is provided for lower conditioning roll 92. Scraper 111 is shown in enlarged detail in FIGS. 4 and 5. In FIG. 4 it may be seen that a stub shaft 112 is journalled in left side sub-frame member 41. A similar stub shaft 114 is journalled in right sub-frame side member 46. An angle member 115 has a left collar 116 welded to its left end and a right collar 118 welded to its right end. Collars 116 and 118 receive shafts 112 and 114, respectively. Pins 119 and 120 lock the collars to the stub shafts. Scraper blade 111 has a J-shaped configuration in cross section as is best seen in FIG. 5. The short leg of the J embraces the vertex of angle member 115. A plurality of bolts 121 extend through angle member 115 and scraper blade 111 and carry springs 122 and nuts 124 on their other ends. In this manner blade 111 is resiliently attached to angle member 115. In FIG. 4, it may be seen that handles 125 are fixedly attached to stub shafts 112 and 114 and extend upwardly therefrom. One, or both,

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of handles 125 may pivotally carry latch pawls 126 (see FIG. 5). Pins 128 carried by the sub-frame structure, are engaged by latch pawls 126 to hold blade 111 in scraping engagement with lower conditioning roll 92. If the latch pawls 126 are disengaged from pins 128, the weight of the scraper blade structure biases the blade about stub shafts 112 and 114 out of engagement with roll 92. In some crops, it is desirable to have the scraper blade mechanism removed completely from the machine. This is accomplished by removing pins 119 and 120 and sliding stub shafts 112 and 114 out of collars 116 and 118.

In FIGS. 1, 2 and 3 it may be seen that cutting means comprising a mower cutterbar 129 is mounted on sub-frame side members 41 and 46 and extends therebetween. A plurality of conventional sickle guards 130 are fixedly mounted on cutterbar 129. A reciprocable sickle bar 131 having conventional triangular knives 132 rivited thereto is mounted on cutterbar 129 for reciprocation relative thereto transverse to the direction of travel of the machine. The left end (FIG. 2) of sickle bar 131 is pivotally connected at 134 to the forwardmost end of a fore-and-aft extending counterbalanced rocker arm 135. Rocker arm 135 constitutes the output member of a conventional wobbler drive 136 whose input member is the pulley 137 best seen in FIG. 1. The various drive trains will be more fully described hereafter, however, it will be apparent that horizontal oscillation of rocker arm 135 of wobbler drive 136 drives sickle bar 131 in transverse reciprocation.

In FIGS. 7 and 3 it may be seen that a generally horizontal angle iron member 138 is mounted at the upper forward end of left side sub-frame member 44. An identical angle iron member 139 is mounted atop right side sub-frame member 48. Journals 140 and 141 are bolted respectively to angle members 138 and 139. In FIG. 9 it may be seen that slots 142 elongated in the fore-and-aft direction, are provided in member 138 to receive the mounting bolts 144 of journal 140. The mounting of journal 141 on angle member 139 is the same as that shown in FIG. 9 for journal 140. Thus, the journals are adjustable relative to the sub-frame in a fore-and-aft direction. A reel, indicated generally by the reference numeral 145, has its central, or main, shaft 146 carried in journals 140 and 141. A plurality of discs 148 (FIG. 2) are mounted on shaft 146. A plurality of crop material engaging raking members in the form of bars 149 carrying tines or flexible fingers 150 are journalled on discs 148 and extend therebetween. In the embodiment shown, six such bars are equally spaced circumferentially about the discs 148. The direction of rotation and the path of travel of tines 150 is indicated by the dot and dash line 151 in FIG. 3. The tines travel in a circuitious path about reel shaft 146 and move downwardly into crop material ahead of sickle bar 131 and then sweep rearwardly over the sickle bar in close proximity thereto and then upwardly and rearwardly to a release location indicated by the letter R in FIG. 3. In FIGS. 8 and 7 it may be seen that each of the bars 149 has a crank-like arm 152 at its one end (the left end relative to the direction of travel of the machine). Each of the arms 152 carries a roller type cam follower 154 at its one end. The rollers 154 ride in a channel shaped cam track 155. The shape of cam track 155, which may be seen in FIGS. 1 and 7, is such as to cause the tines 150 to travel in the path indicated by the line 151 in FIG. 3 while the reel, in general, rotates about its shaft 146. Cam 155 is bolted in a fixed position relative to the axis 146 of reel 145. The cam mounting bolts 156 (FIG. 7) extend through slots 158 in reel journals 140 and 141 and sub-frame side plates 159 which are fixed to sub-frame members 41, 44, 45 and 46, 48, 49 at each side of the reel. By loosening bolts 156, the operator can shift cam track 155 rotatably, within the limits afforded by slots 158, to adjust the path of tine travel relative to the mower, the conditioning rolls and the crop guiding surface in compensation for the different handling characteristics of different types of crops.

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A crop material guiding plate 160 (FIGS. 3 and 7) extends between the sub-frame side plates 159 and is fixedly attached thereto. Guide plate 160 extends upwardly and rearwardly from the mower cutterbar 129 toward the downwardly and forwardly diverging crop material receiving bite of conditioner rolls 92 and 94. The plate 160 is generally concentric to the axis 146 of reel 145 and has a rear terminal edge at 170 which is parallel to the axes of the conditioning rolls and the shaft 146 of the reel. The terminal edge 170 of crop material guiding plate 160 is spaced forwardly from lower conditioning roll 92 an amount sufficient to allow stones and other foreign objects to fall to the ground rather than being fed between the conditioning rolls. The crop material engaging tines 150 of the reel sweep upwardly and rearwardly along the surface of plate 160 in close proximity thereto pushing mown crop material into gripping relation with the receiving bite of the conditioner rolls. At the location R, the cam track 155 causes bars 149 and tines 150 to pivot from their radially extended crop engaging position downwardly to a non-radial position from which rotation of reel 145 lifts the tines upwardly out of the crop material. Upper conditioner roll 94 rotates in the counterclockwise direction as seen in FIG. 3 and is disposed close to the path of tine travel to strip crop material downwardly from the tines as they move upwardly out of the material.

In FIGS. 1 and 2 it may be seen that the output shaft 31 of gearbox 30 carries a first sprocket 171 just outside of sub-frame mounting journal 39. An endless chain 172 extends upwardly therefrom to spring loaded idler 173. From idler 173, chain 172 extends upwardly and forwardly and about the forwardmost side of a drive sprocket 174 of top conditioner roll 194. Endless chain 172 then wraps about the rear side of a sprocket 175 of lower conditioner roll 92 and back to drive sprocket 171. On the outboard side of sprocket 171 shaft 31 carries a drive pulley 176. An endless belt 178 is entrained about pulley 176 and has an upper reach extending downwardly and forwardly therefrom and under an adjustable idler, not numbered. Belt 178 then wraps about the drive pulley 137 of the sickle bar wobbler drive unit 136 previously described and returns back to drive pulley 176. Since the rotational speed of reel 145 is substantially less than that of the conditioner rolls and the sickle drive mechanism, a speed reducing drive train is provided between drive shaft 31 and reel 145. A small diameter sprocket 179 is carried by shaft 31 between pulley 176 and gearbox 30. An endless chain 180 is entrained about sprocket 179 and a large diameter sprocket 181 carried by an idler stub shaft 182 journalled on the sub-frame. A small diameter spring loaded idler 184 engages the upper reach of chain 180 between sprockets 179 and 181 to maintain proper drive chain tension. A pulley 185 smaller than sprocket 181 is keyed to idler shaft 182 and driven thereby. An endless belt 186 is entrained about pulley 185 and a larger diameter pulley 188 keyed to reel shaft 146. A spring loaded idler 190 engages belt 186 between pulleys 185 and 188 to maintain proper belt driving tension.

The novel combination and relationship of elements to which the success of the present invention is directly attributable is most clearly seen in FIG. 3. It is the relationship and relative positioning on the sub-frame of the reel, the mower, the conditioner rolls and the guiding surface 160. Consider first the path of travel of the crop material engaging tines 150 of the reel. As in other known reels, these tines have a crop material engaging point and a crop material release point. The engaging point is forwardly of the mower to lift and rake tangled crops. The path of travel of the tines in moving from the point of crop material engagement to the release point extends over the mower means 131 and in close proximity thereto. This relationship positively rakes the cutterbar clean thereby substantially increasing the capacity of the mower beyond its individual capability while rendering the mower substantially unpluggable. From the mower, the tines 150 swing

upwardly and rearwardly along guide plate 160 which confines the crop material to an area which is positively swept clean by the tines. The feeding capability of the reel is enhanced beyond that of conventional reels by the fact that the surface of plate 160 prevents movement of the crop material radially out of engagement with the tines. The rear terminal edge 170 of the crop material guiding surface is in close proximity to the path of the tine travel and is disposed at the point of release of the tines on the crop material. The guiding surface 160 directs material directly into the receiving bite of the conditioning rolls. The conditioning rolls are mounted in a position wherein they begin to engage the crop material as the tines begin to release it. Thus, the crop material is positively fed by the reel over the sickle bar and upwardly and rearwardly into the bite of the conditioning rolls. The large diameter of the lower conditioning roll 92 provides a large moving surface on the under side of the crop material being fed between the rolls while the relatively forward disposition of upper conditioning roll 94 along with the aggressive peripheral surface thereon positively strips crop material downwardly and rearwardly into the bite of the rolls from the tines 150 as they release the material and lift upwardly in front of the top conditioning roll. The positive feeding of crop material directly into the bite of the rolls by the reel prevents accumulation and bunching of material in front of the rolls. The above relationship of elements effects positive engagement and feeding control of the material to be harvested from a time prior to its being mowed until its exit from the conditioning rolls.

While this invention has been described in connection with a particular embodiment thereof, it will be understood that it is capable of modification, and this application is intended to cover any variations, uses, or adaptations following, in general, the principles of the invention and including such departures from the present disclosure as come within known or customary practice in the art to which the invention pertains, and as fall within the scope of the invention or the limits of the appended claims.

Having thus described our invention, what we claim is:

1. A device for harvesting crop material comprising a mobile frame adapted to travel forwardly through a field, an elongated reel having a central axis and crop material engaging tine members, means journalling said reel on said frame with the axis of the reel generally parallel to the ground and transverse to the direction of travel of said frame, means rotatably driving said reel about its central axis in a direction to move said crop material engaging tine members in a predetermined path of travel downwardly at the front of said reel then rearwardly under said reel axis in close proximity to the ground and then upwardly and rearwardly behind the axis of said reel, cutting means carried by said frame and disposed generally under said reel rearwardly of said central axis between said path of travel of said crop material engaging tine members and the ground and operable to mow a swath of crop material substantially the width of said reel, a fixed crop material guiding surface extending upwardly and rearwardly from said cutting means generally concentric to the axis of said reel and in close proximity to the path of travel of said crop material engaging tine members, said surface having a rear terminal edge behind said reel and also in close proximity to said path of travel of said crop material engaging tine members, a pair of parallel crop conditioning rolls having therebetween a crop material receiving bite, said rolls having a length substantially the same as said reel and coacting to condition the stems of crop material passing therebetween, means journalling said rolls on said frame behind and parallel to said reel with the bite of said rolls below said axis of said reel and adjacent said rear terminal edge of said crop material guiding surface, said crop material engaging tine members moving downwardly into crop material forwardly of said cutting means and then combing and sweeping said crop material rearwardly over said cutting means and then upwardly and rearwardly over said crop material guiding surface and discharge it directly into the bite of said conditioning rolls, and means rotating said rolls faster than said reel whereby said rolls strip crop material from said tine members.

2. A device for harvesting crop material as recited in claim 1 wherein one of said conditioning rolls is disposed above the other conditioning roll and has its axis disposed forwardly of the axis of said other roll whereby said crop receiving bite diverges downwardly and forwardly toward said upwardly and rearwardly extending crop material guiding surface.

3. A device for harvesting crop material as recited in claim 1 wherein one of said conditioning rolls is disposed above the other conditioning roll, said other conditioning roll being disposed behind said rear terminal edge of said crop material guiding surface and spaced therefrom a substantial distance to permit stones and other heavy foreign objects to fall through the space between said rear terminal edge and said other roll, and means rotatably driving said other roll in a direction to carry crop material upwardly and rearwardly thereover from said rear terminal edge.

4. A device for harvesting crop material as recited in claim 3 wherein said one of said conditioning rolls is disposed forwardly of said other conditioning roll and spaced above said rear terminal edge of said crop material guiding surface, and said means rotatably driving said one of said rolls in a direction to strip crop material downwardly from said crop material engaging tine members and feed said material rearwardly thereunder into said bite.

5. A device for harvesting crop material as recited in claim 1 wherein one of said conditioning rolls at least is provided with an aggressive peripheral surface.

6. A device for harvesting crop material comprising a mobile frame adapted to travel forwardly through a field, cutting means carried by said frame adjacent the ground for moving a swath of crop material, an elongated reel having a central axis and crop material engaging raking members, means journalling said reel on said frame above said cutting means with the axis of the reel generally parallel to the ground and transverse to the direction of travel of said frame, means rotatably driving said reel about its axis in a direction to move said crop material engaging raking members in a path of travel downwardly into crop material at the front of said reel and ahead of said cutting means then rearwardly under said reel axis and above said cutting means to sweep material rearwardly over said cutting means and then convey cut material upwardly and rearwardly behind the axis of said reel to a predetermined crop material release location above and behind said cutting means, means for changing the extension of said raking members at said release location whereby the raking members move upwardly out of engagement with said crop material, a pair of parallel fixed crop material conditioning rolls having therebetween a crop material receiving bite, said rolls having a length generally the same as said reel and coacting to condition the stems of crop material passed therebetween, and means journalling said rolls on said frame behind and parallel to said reel with the bite of said rolls disposed at said crop material release location of the crop material engaging reel members whereby said members sweep crop material rearwardly over said mower and discharge the material after it has been cut directly to the material receiving bite of said rolls.

7. A device for harvesting crop material comprising a mobile frame adapted to travel forwardly through a field, cutting means carried by said frame adjacent the ground for mowing a swath of crop material, an elongated reel having a central axis and crop material engaging tine members, means journalling said reel on said frame above said cutting means with the axis of the reel generally parallel to the ground and transverse to the direction of

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travel of said frame, means rotatably driving said reel about its central axis in a direction to move said crop material engaging tine members in a predetermined path of travel downwardly into crop material at the front of said reel and ahead of said cutting means then rearwardly under said reel axis and above said cutting means to sweep material rearwardly over said cutting means and then upwardly and rearwardly behind the axis of said reel to a predetermined crop material release location above and behind said cutting means, means for pivoting said crop material engaging tine members at said location whereby the tines move upwardly and out of said crop material, means carried by said frame and having a fixed crop material guiding surface extending upwardly and rearwardly from said cutting means generally parallel to the path of travel of said crop material engaging tine members and in close proximity thereto, said surface having a rear terminal edge at said predetermined crop material release location, a pair of parallel crop material conditioning rolls having therebetween a crop material receiving bite, said rolls having a length generally the same as said reel and coacting to condition the stems of crop material passed therebetween, and means journalling said rolls on said frame behind and parallel to said reel at said crop material release location with the bite of said rolls adjacent said rear terminal edge of said crop material guiding surface whereby said crop material engaging tine members sweep comb material rearwardly over said cutting means and then upwardly and rearwardly along said guiding surface and into the bite of said conditioning rolls.

8. A device for harvesting crop material as recited in claim 7 wherein said crop material engaging tines members are mounted on said reel for movement relative thereto between a radially extended crop sweeping position and a nonradial crop release position, cam means on said reel engageable with said crop material engaging members for controlling movement thereof between said crop material sweeping position and said release position and means adjustably mounting said cam means on said reel to facilitate adjustment of the point on said predetermined path of travel of said crop material engaging members at which said members are moved from their material sweeping position to their material release position.

9. A device for harvesting crop material as recited in claim 8 wherein said means journalling said reel on said frame is mounted on said frame for adjustment forwardly and rearwardly relative to the frame to adjust the relationship of said release location relative to said crop material receiving bite.

10. A device for harvesting crop material as recited in claim 7 wherein one of said conditioning rolls is disposed with its axis above and forwardly of the axis of the other of said conditioning rolls, and wherein the axis of said other conditioning roll is spaced rearwardly from said rear terminal edge a distance greater than the radius of said other roll to provide substantial space between said rear terminal edge of said guiding surface and said other roll for stones and the like to fall from the device without passing between said conditioning rolls.

11. In a harvesting machine:

elongated cutting mechanism disposed transversely of the path of travel of the machine;

an elongated, stationary ramp extending along said mechanism and being transversely inclined upwardly and rearwardly therefrom and in disposition to receive a crop cut by said mechanism;

structure disposed forwardly and above said mechanism for sweeping a swath of a crop rearwardly and upwardly into said mechanism, said structure having means for moving the cut swath up said ramp and thereupon projecting the same upwardly and rearwardly beyond the ramp before the cut crop is permitted to fall to the ground;

a crop-engaging bar extending transversely of said path of travel above the level of said mechanism and forwardly of said structure; and a crop conditioner substantially as long as said cutting mechanism disposed adjacent said moving means to receive projected material.

12. A harvesting machine as set forth in claim 11 wherein said crop conditioner is above and rearwardly of the ramp within the path of projection of the cut swath and comprises a pair of conditioning rolls mounted one above the other and between which the crop is passed.

13. A harvesting method comprising the successive, uninterrupted steps of sweeping a swath of a growing crop rearwardly and upwardly toward an elongated cutting zone and toward an elongated conditioning area disposed above and to the rear of said cutting zone, cutting the swath at said cutting zone while the crop is being swept thereinto, and thereupon conveying the cut crop smoothly, continuously and uniformly to higher elevations while it is maintained off the ground by:

catching the entire swath of the cut crop at an elongated, transversely inclined station extending upwardly and rearwardly from said zone, said zone, said station and said area being coextensive in length with and parallel to said swath, said area being spaced upwardly and rearwardly from the uppermost and rearmost extremity of said station;

disposing said entire swath of the cut crop over and onto said station by forces applied to the crop from directly above the station continuously in a direction extending upwardly and rearwardly from said zone, and while the crop remains in a condition spread along said station longitudinally of the latter;

combing the swath disposed on said station rearwardly along the entire length of said extremity closely adjacent the latter and along a region extending upwardly therefrom and coextensive in length therewith to forceably direct the swath upwardly and rearwardly into said area;

conditioning said crop within said area while the crop is in flight flowing upwardly and rearwardly from said station; and

projecting the crop in a continuous stream flowing along a path normal to, and extending upwardly and rearwardly from said area.

14. A harvesting machine comprising a mobile frame on which a mower, a reel, rotatable about its longitudinal axis, and a pair of cooperative conditioner rolls are mounted transverse to the direction of travel of said frame and all having substantially the same length, said mower being mounted on said frame forwardly of and below said rolls adjacent the ground for cutting a swath of crop material of a width substantially the length of said rolls, the latter defining a crop receiving bite below said reel axis and disposed directly adjacent said reel, characterized by a stationary guide plate extending upwardly and rearwardly from said mower toward the bite of said rolls, said reel having crop material engaging tine members at the outer periphery thereof for combing and sweeping crop material over said mower, then conveying cut material over said plate and discharging it directly to the bite of said rolls and means rotating said rolls faster than said reel to strip crop material from said tine members.

15. A device for mowing and conditioning crop material comprising a mobile frame having a pair of laterally spaced ground wheels and being adapted to travel forwardly through a field of standing crop material, an elongated reel having a central axis and crop material engaging tines, means journalling said reel on said frame with the axis of the reel generally parallel to the ground and transverse to the direction of travel of said frame, means rotatably driving said reel about its central axis in a direction to move said tines in a path downwardly at the front of said reel then rearwardly under said axis along the ground and then upwardly and rearwardly behind the axis of the reel, cutting means carried by said

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frame and disposed generally under said reel to mow a swath of crop material whose width substantially equals the axial length of the reel, a pair of rotatable crop material conditioning rolls each having substantially the same axial length as said reel and cooperating to condition crop material passed between them, one of said rolls at least having an aggressive crop material engaging surface, means journalling said rolls one above the other on said frame rearwardly of said reel and in close proximity to the path of travel of said reel tines, said rolls being parallel to each other and to said reel and defining a forward crop receiving bight, a stationary guide plate carried by said frame and having a crop material supporting surface extending upwardly and rearwardly from said cutting means to adjacent said bight of said conditioning rolls, said plate being in close proximity to said path of travel of said tines for a substantial portion of the upward rearward extension of the plate, said reel tines engaging and combing standing crop material forwardly of said cutting means and then sweeping the crop material over said cutting means and after it is cut then upwardly and rearwardly over said guide plate directly to said bight of said conditioning rolls, said guide plate slidably supporting the crop material as it is conveyed from the cutting means to said bight, and drive means rotating said rolls faster than said reel to strip material from said tines.

16. A device as recited in claim 15 wherein said tines are pivotally mounted on said reel, and means is provided for pivoting the tines during their path of travel when the tines are adjacent said roll bight to withdraw the tines from the material and facilitate the discharge of material to said rolls.

17. A device as recited in claim 15 wherein said guide plate has an upward rearward terminal edge spaced forwardly of the lower roll of said pair of rolls and beneath said bight, rocks and the like being adapted to drop through the space between the plate and said lower roll and thus not pass between the rolls.

18. A device for mowing and conditioning crop material as recited in claim 17 wherein the upper roll of said pair of rolls has an axis forwardly of the axis of said lower roll whereby said bight faces generally forwardly and downwardly to better receive crop material delivered upwardly and rearwardly over said guide plate and the axis of said reel being higher than said bight and forwardly of said cutting means.

19. A harvesting machine comprising a generally right angular frame structure having a frame member which extends transverse to the direction of travel and a frame section which extends forwardly from one lateral end of said frame member and generally parallel to ground travel, a pair of ground wheels, one adjacent each lateral end of said frame member, a drawbar on said frame section for connection to a towing vehicle, a mower, a reel and a pair of cooperative conditioner rolls mounted on said frame member transverse to said direction of travel and all having substantially the same length, said mower being mounted on said frame member forwardly of and below said rolls adjacent the ground for cutting a swath of crop material of a width substantially the length of said rolls, said rolls being located one above the other and defining a crop receiving bight relatively close to the path of travel of said reel, a stationary guide plate extending upwardly and rearwardly from said mower to a terminal location toward the bight of said rolls, said reel having crop engaging tines thereon for simultaneously combing the crop material from above and sweeping it over said mower and then upwardly and rearwardly over said guide plate and discharging the material directly to the bight of said rolls, said tines travelling closed to said guide plate as they travel over the plate, one of said rolls at least having an aggressive material engaging surface to strip crop material from said reel tines, and drive means rotating said reel and driving said rolls in opposite directions and faster than said reel whereby material will be passed between the rolls and discharged rearwardly therefrom for deposit on the ground.

20. A harvesting machine as recited in claim 19 wherein said upper roll has said aggressive material engaging surface which moves in a direction opposite to the travel of said tines on said reel whereby the upper roll strips material downwardly as the tines travel upwardly.

21. A harvesting machine comprising a generally right angular frame structure having a frame member which extends transverse to the direction of travel and a frame section which extends forwardly from one lateral end of said frame member and generally parallel to ground travel, a pair of ground wheels, one adjacent each lateral end of said frame member, a fore-and-aft extending drawbar on said frame section, a hitch at a forward end of said drawbar for connection to a towing vehicle, a subframe pivotally supported on said frame structure for movement relative to said transverse frame member, a mower, a reel, a fixed crop material guiding plate and a pair of cooperative conditioner rolls mounted on said subframe transverse to said direction of travel and all having substantially the same length, said mower being mounted on said sub-frame below said rolls adjacent the ground for cutting a swath of crop material of a width substantially the length of said rolls, said rolls being located one above the other and defining a forward crop receiving bight adapted to receive crop material from said mower without the material touching the ground, said fixed crop material guiding plate on said frame extending upwardly and rearwardly from said mower toward the bite of said rolls, said reel having radial crop engaging flexible fingers thereon for engaging crop material upon rotation of the reel to facilitate the engagement of the material by said mower and then discharging cut material directly to said rolls, one of said rolls at least having an aggressive material engaging surface to engage and positively convey material after it has been cut by said mower, and drive means rotating said reel and driving said rolls in opposite directions whereby material will be passed between the rolls and discharged rearwardly therefrom for deposit on the ground.

22. A harvesting machine as recited in claim 21 wherein said forwardly extending frame section comprises a pair of laterally spaced, fore-an-aft members connected at their rearward ends to said transverse frame member and at their forward ends by a cross member, and said drawbar being pivotally connected adjacent the forward end of said frame section.

23. A device for harvesting crop material comprising a mobile frame adapted to travel forwardly through a field, a pair of rolls which coact to condition the stems of crop material passed therebetween, means journalling said rolls on said frame with their axes parallel to each other and transverse to the direction of travel of said frame, said rolls defining therebetween a rearwardly converging crop material receiving bite, a mower mounted on said frame forwardly of and below said rolls adjacent the ground for cutting a swath of crop material of a width substantially the length of said rolls, a fixed crop material guiding plate on said frame extending upwardly and rearwardly from said mower toward the bite of said rolls, a reel having a central axis of rotation above and forwardly of said bite and crop material engaging raking members which travel in a circuitous path about said axis, said fixed guiding plate being located in close proximity to said circuitous path of said raking members, journals on said frame mounting said reel in a position wherein said crop material engaging raking members sweep rearwardly over said mower then upwardly and rearwardly along said material guiding plate to said bite of said rolls to conveyor material over the plate and discharge crop material cut by said mower directly into the bite of said rolls, and means rotating said rolls at speeds faster than said reel whereby the rolls strip the delivered crop material from said raking members.

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24. A device for harvesting crop material comprising a mobile frame adapted to travel forwardly through a field, an elongated reel having a central axis and crop material engaging raking members, means journalling said reel on said frame with the axis of the reel generally parallel to the ground and transverse to the direction of travel of said frame, means rotatably driving said reel about its central axis in a direction to move said crop material engaging raking members in a path of travel downwardly at the front of said reel then rearwardly under said axis in close proximity to the ground and then upwardly and rearwardly behind the axis of said reel, cutting means carried by said frame and disposed generally under said reel between said path of travel of said crop material engaging raking members and the ground and operable to mow a swath of crop material whose width substantially equals the axial length of said reel, a pair of crop material conditioning rolls each having substantially the same axial length as said reel and cooperating to condition the stems of crop material passed therebetween, means journalling said rolls on said frame rearwardly of said reel and in close proximity thereto with the axes of said rolls parallel to the axis of said reel, means carried by said frame and having a fixed crop material guiding surface extending upwardly and rearwardly from said cutting means toward said conditioning rolls generally parallel to and in close proximity to the path of travel of said crop material engaging raking members, said crop material engaging raking members engaging crop material forwardly of said cutting means and then sweeping said crop material rearwardly over said cutting means and then conveying cut material upwardly and rearwardly over said crop material guiding surface and then discharging the material directly to said conditioning rolls, and means rotating said rolls faster then the speed of said reel whereby the rolls exert a stripping action on said raking members.

25. A device for harvesting crop material as recited in claim 24 wherein one of said pair of crop conditioning rolls is an upper roll disposed generally above the other of said pair of rolls in crop stripping relation to said crop material engaging raking members, means rotatably driving said upper roll in a direction to strip crop material downwardly and rearwardly from said raking members and carry said material between said rolls, and one of said rolls having a relatively aggresive surface.

26. A device for harvesting crop material as recited

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in claim 25 wherein said upper crop conditioning roll is forwardly of said other roll whereby the bite between the rolls faces downwardly.

27. A method of mowing a given width swath of standing crop material and then immediately conditioning the cut crop while maintaining the material in a continuous stream and substantially in said given width comprising:

travelling over a field having the crop to be harvested,

raking the standing crop with finger-like elements which travel in a downward, rearward direction and then sweep the crop in a rearward and upward path,

cutting the standing crop as it is being raked and swept rearwardly

catching the entire swath after it is cut and maintaining the crop off of the ground in a transverse mat substantially as wide as the swath cut,

supporting said mat from below on a fixed upwardly and rearwardly extending guide surface in close proximity to said rearward and upward path,

combing and conveying said mat rearwardly with said finger-like elements as the crop is supported and forceably directing the cut crop in an upward rearward direction,

discharging said mat from said guide surface and at the same time withdrawing said finger-like raking elements from the crop coupled with simultaneously exerting a positive pulling force at the discharge location to strip the material from said raking elements,

conditioning the transverse mat by passing it between a pair of rolls and while still maintaining the crop substantially as wide as the swath cut,

and then projecting the conditioned mat in a continuous rearward stream.

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2,698,170	12/1954	Foley	56—1 X
3,165,875	1/1965	Mitchell	
3,224,177	12/1965	Adee	56—23
1,926,538	9/1933	Hume et al.	56—226
2,114,580	4/1938	Thompson	56—1

ANTONIO F. GUIDA, *Primary Examiner.*

ABRAHAM G. STONE, *Examiner.*

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Publication Showing Crose Machine (PX 11)

Haying Time Cut In Half

By DAN CHASE

P.-Ex. Attorney
Def. X 1 2

Raymond Pascoe, Bakersfield, Calif., examines alfalfa that has just been crushed by mower.

■ Haying time can be cut in half with a one-man, self-propelled hay processor which mows, crushes and windrows in one continuous operation.

Cutting head, made up of reel, sickle, rollers and auger, processes a 10-foot swath as unit moves forward at working speeds of from 1 to 10 miles an hour. The dual purpose rotating reel picks up fallen plants and feeds two rollers which do the crushing.

Crushing speeds drying of stems so they are cured by the time leaves are cured. Losses due to leaf shattering are reduced and more color is retained, thus favoring higher protein and caro'ene content.

Tension adjustment

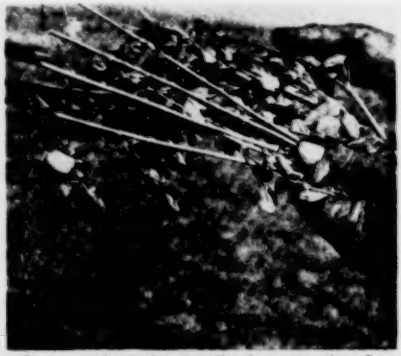
Made of 8-inch standard machined pipe, the rollers can be hydraulically separated three inches and have a tension adjustment so the operator can set tension according to thickness or condition of the stand. The 3-inch clearance also makes it possible to harvest alfalfa seed by first windrowing and later combining.

Pascoe operates the self-propelled hay mower which puts up hay faster and saves carotene.

Reel gathers fallen alfalfa and feeds the two crushing rollers as 10 ft. swath is processed.

Plants are taken in by rollers and crushed so stems will cure by the time leaves are ready for baling.

C. Man, Self-Propelled Mower Cuts Haying time, Crushes and Windrows in Single Operation, Saves Protein, Carotene Content



Plants are beginning to wilt after processing. By crushing but not breaking stems, protein is saved.

And because the whole haying operation is speeded up by as much as 50%, a cutting of hay can be made before the stand is allowed to mature for seed.

Following crushing, plants flow to an auger, which can be set to let them fall the width of the 10-foot swath or they can be augered into a 36-inch windrow. In addition to being raised and lowered hydraulically, the entire cutting head has floating action so it can readily cross, straddle or split borders. Under most conditions 30 to 40 acres of alfalfa can be processed daily.

One motor

Powered by a Ford Industrial motor, the machine has two transmissions, one of which is for ground speed. The other transmission is for the reel, rollers, auger, and sickle which also have live power.

Manufactured by the H. L. Crose Co. of Tulare, Calif., the machine in the accompanying pictures was in operation on the Canfield Ranch of Francy & Pascoe, Bakersfield, Calif.

END

Ford tractor powers unit which has two speeds, one for ground speed, one for running the cutting head.

Crushed plants go to auger which can be set so alfalfa falls in 36 in. windrows or 10 ft. swath.

Entire cutting head can be raised for road travel or for passing over obstructions encountered in fields.

Part Of The Patent-In-Suit's "File Wrapper" (PX-2), Comprising An Excerpt From An Argument Filed In The Patent Office By Petitioner On September 21, 1967.

REMARKS

Applicants' attorney acknowledges and thanks the Examiner in this case for the courtesy of the interview on September 19, 1967. As agreed during this interview, Claims 15, 28, 29 and 30 have been cancelled to reduce the total number of claims and in the interest of advancing this case to issue. The retained claims have been reviewed and amended to more clearly define applicants' major advance in the harvesting arts and distinguish from the references. Claims 1-4 have been rewritten as Claims 34-37 to provide clean copy and render a reading of the claims easier; method Claim 38 has been added; and Claim 31 has been amended, as agreed, to conform more closely to Claim 34.

As pointed out in the interview, applicants' machine substantially differs from the structure in Foley Pat. 2,698,120 and the claims, particularly as amended, clearly patentably distinguish therefrom.

Consider Claim 34, original Claim 1. Such claim recites that "extending upwardly and rearwardly from the mower toward the bite of the said rolls" is a "guiding plate" which is "fixed.". The reel has "raking members" which travel "in a circuitous path" and the "guiding plate" is located "in close proximity" to the path of the raking members. The raking members sweep rearwardly over the mower and then they convey the cut crop over the fixed plate and discharge the material "directly into the bite of said rolls". The rolls, rotating faster than the reel, strip material from the raking members.

In Foley, the reel is a bat reel; there are no raking members as claimed. Foley shows no fixed guiding plate.

File Wrapper Excerpt (Cont'd)

An endless feeder conveyor 12 is provided. The hay cut by Foley's mower,

> "is carried rearwardly by the reel 11 and deposited upon the conveyor 12 which feeds it to the crushing rolls 13 and 14. The conveyor 12 is formed with an endless belt—".

The reel does not deliver the hay "directly" to rolls, as claimed, but to the intermediate conveyor 12. Claim 34 thus distinguishes from Foley.

Further, even if a fixed floor were substituted for conveyor 12 in Foley, as suggested by the Examiner, per Adee Pat. 3,224,177, such floor would not be "in close proximity to said circuitous path of said raking members" as claimed. The surface of conveyor 12 is not disposed to relate the path of the reel. Still further, in applicants' machine, the rolls strip the crop material from the raking members. In Foley there are no raking members as employed by applicants and even if there were, the rolls are so located relative to the reel that a stripping action would not take place.

In Adee, the rollers 96 and 98 have a length only a small portion of the length of the cutter bar 52; the mower and rolls are not substantially the same length, as claimed. The reel delivers the crop not to the rolls but to the auger 84 which laterally conveys and consolidates the material in the trough 36. Auger impellers 90 and 92 then impel the crop rearwardly to the rollers 96 and 98. Obviously, in Adee there is no discharge of the crop directly to the rollers by the reel, nor is there a crop stripping relation between the reel tines and the rollers.

Excerpts From The Deposition Testimony Of O. E. Martin (PX 16A).

A. It was either in 1956 or '57 that I formed a company called Winter Cure Hay Company. Then I had a partner by the name of Wally Tow, T-o-w; and we got the fantastic idea that we could go out here in the wintertime and process hay and make hay the year round.

Q. In carrying out this business, will you just tell us in your own words, first of all, covering it broadly—we may fill in some of the details later—tell us what you did first with respect to getting equipment, and from the point of view of getting access to hay to be processed.

A. You mean how we started the company?

Q. Yes.

A. Well, as you know, you're going to rack my memory for 13 years. As I can recall, one time I took some hay and run it through an old wringer type washing machine, and I also saw a machine work in Litchfield, Arizona in the forties some time or another. This was being demonstrated by, I think, a John Bean Company. B-e-a-n, is that the way it's spelled? I don't really remember. I don't think there is such a company now. I don't know how Mr. Tow and I really got the idea, but some way or another we did, and we had Crose Company make us up a machine.

Q. Go ahead, Mr. Martin. Would you describe the machine in a general way?

A. Well, it was a self-propelled machine. We had two rollers installed in it for processing the hay, for pressing the hay; and then later on we purchased a total of three Crose machines and one Field Queen.

Q. I want to ask you a lot of questions about how the machine was made, then we'll get back to that later. First of all, in the first instance, you bought one machine; is that correct?

A. Yes, I think so.

Q. Well, I'll put it like this. I don't want to lead you. Tell me what you did. Was your initial operation conducted entirely on land that you had leased yourself, or

did you lease the processing of hay that you bought from other farmers?

A. Well, the experimental work we did was done on land that I leased, but then when we formed the company, what we did, we would go out and buy fields of hay, buy the hay standing in the field, and then we would process it; and if the dice didn't show craps, we made some money. It was a big gamble.

Q. Incidentally, I take it that this element of gamble is present in all farming to some degree, isn't it?

A. Oh, yes.

Mr. Mayer: That's leading.

Q. By Mr. McDougall: Now, when you spoke of processing the hay, I would like to have you explain to the Court just what this consisted of. In the first place, I take it the hay had to be cut, did it not?

A. Well, that's what we bought the machines for, was for the cutting and the rolling of the hay.

Q. Well, the hay was first cut and then rolled?

A. With the same machine. It was self-propelled.

Q. Then what was done with the hay after that? Was the hay left lying on the field?

A. Yes.

Q. What was the next step in the processing operation?

A. It was raked, and baled, and roadsided.

Q. And ultimately, I take it, you shipped it to a market somewhere for sale, or did you sell it here?

A. Most of it to Los Angeles, yes.

Q. Approximately how long after you got the first machine did you put in your order to Crose for the other two? First of all, did you buy the other two on the same order, or did you get them at different times?

A. This I cannot recall. I don't think—I think we bought one, and then I think we ordered two more.

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Q. Now, what is the effect—and I am asking you now to draw on your own experience, if you have any; if you don't have any, you can say so—What is the effect of passing hay between rollers that have surfaces that are

not smooth as opposed to crushing it between smooth-faced rollers?

A. Well, running it through the type of machine of the Cunningham, it had a chance to tear the hay up real bad; and running it through the type of rollers that we came out with, why, the hay was left beautiful so that it attracted the eye for sales.

Q. Now, what is the purpose of rolling hay, regardless for the moment of the kind of rollers that are used, what is the purpose that the farmer has in mind in passing hay through rollers?

A. Well, we use it to substract the moisture and expedite the curing of the hay.

Q. It assists in the drying process?

A. Yes.

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Q. By Mr. McDougall: Now I am asking you: In the design of the machine was your wish to keep the hay whole rather than breaking it up a factor in the selection of the smooth rollers?

A. We used the smooth rollers because that's what we wanted.

Q. Could you give me your best estimate—and please realize that with all this time I don't expect you to have a number that is specifically accurate—but could you give us your best estimate of how many acres of hay you processed with the use of these four machines you have told us about during the period that you were in this hay curing business?

A. This would be a wild guess. One of these machines was capable of processing 40 acres a day; and, of course, in the wintertime you have rain and you have frost, where you can't get in the fields some days early. I would just be picking a figure out of the air if I did. I think probably Mr. Tow could tell you, because he was the one that contracted—he was the one that made the arrangements for buying the hay standing in the fields. It would be in the neighborhood of five or 6,000 acres, but I don't know.

Q. All right, good enough. Now, as I say, I did not expect you to have a firm numerical value in arriving at

that point. Let me ask you this further question. You told us when we were here about a month ago about a weather disaster that ultimately resulted in financial loss to you and your partner, and the decision to give up this business. Would you tell us now essentially what happened on that occasion?

A. Well, when we started out with the—Just let me reminisce.

Q. Sure, please do. That's what I want you to do.

A. When we started out with the first machine, why, in the—I would say approximately the first 35, 40 days, why, we made a considerable amount of money. We thought this was a way to get rich, so we bought those three additional machines. We run into a problem where we had several acres of hay on the ground that we had paid $20 an acre for, and it rained for several days, and we wasn't able to move it. When we finally was able to get this hay in a stack, we had sold it for $10 a ton, or thereabouts.

Then we run into another condition by having the four machines, that we had at some times six, seven or 800 acres of hay laying on the ground, and then we went through a dry spell of where the hay—where it was crushed, and once it got dry it seemed not to want to pick moisture back up so we could rake it and bale it.

So it's the case where if you had one machine and done just a few acres of hay, we could have made a lot of money; but with four machines and a lot of hay on the ground, we lost money.

Q. And ultimately, I take it, the result of this was that you decided to give it up and go into some other activity?

A. Well, I had other business that I was doing that was making me money, so I discontinued this.

Q. When you broke up your partnership with Mr. Tow, what did you do with the machines?

A. I retained the Field Queen machine and one of the Crose machines, and he retained two of the Crose machines; and a lot of the tractors, and rakes, and balers, and stuff like that belonged to me anyway.

Excerpts From The Deposition Testimony Of Wallace Tow (PX 16B).

Q. Thank you, Mr. Tow. As I am sure you know, the period of your life that we are primarily interested in today are the two years you spent in the hay processing business. Will you tell us—well, you have already stated that that ended in 1958. Did it commence in 1956?

A. It commenced in '56, yes.

Q. Would you tell us in your own words very briefly the nature of the business and the identity of your associates, if any?

A. Well, this was a partnership between Orville Martin and me, with the idea in mind of utilizing some self-propelled stem crushing machines, both on a custom basis, in which we would mow and crush on an acreage basis for the individual farmer; and also the buying of fields, and crushing them, and baling them, and handling the entire products ourselves.

Q. When you use the term "buying a field," I take it you are referring to purchasing a standing crop rather than purchasing the land?

A. That's right, purchasing the standing crop.

Q. Did you in fact carry on the business in both of the two ways you have mentioned?

A. Yes.

Q. Did your relationship with Mr. Martin continue throughout the two-year period that you have indicated?

A. No. We divided the equipment between us and went our separate ways after the first year of operation, or shortly after. It might have been a little more than a year that we operated in that manner.

Q. Well, in substance, you worked in partnership with Mr. Martin during the first year, and you were on your own during the second year?

A. That's right.

Q. Tell us, if you will, in your own words the nature of the general structure of the self-propelled machines you have spoken about.

A. Well, it was a self-propelled machine with a ten-foot cutter bar, and rolls that were ten feet wide, the full

length of the cutter; and the hay went through these rolls, which were about eight inches in diameter. The hay went through the rolls and could either be brought into a windrow with some augers behind the rolls, or dropped directly on the ground without windrowing.

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Q. Now, you indicated that you carried on the business for another season after Mr. Martin got out of it. Was there any difference in your mode of operation during the second season, or were you still carrying on partly custom and partly buying standing crops?

A. No. The second season I went into strictly custom mowing.

Q. So you were not buying standing crops?

A. No.

Q. Very good. When you dissolved the partnership, how were the physical assets divided, that is to say the machines divided up between you?

A. I took two and a half, and Mr. Martin took one and a half.

Q. Would you explain that to us?

A. Well, we shared the ownership in the Field Queen, which is the Kansas machine.

Q. But you had two Crose machines and Mr. Martin had one?

A. That's right.

Q. In the course of your operations in this business, did you have any relationship with the New Holland Company?

A. Yes. I took care of spotting of their rakes in various hay fields. They had experimental equipment down here, and I took care of that and reported to New Holland Company on the operation of the machines.

Q. Who were the specific persons in New Holland that you dealt with?

A. Well, the only name that I recall now is Mr. Happe, which is H-a-p-p-e, who was the head of the engineering department, as I understand, at that time.

Excerpt From The Deposition Testimony Of Raymond Pascoe (PX 16D).

Q. How long did you operate the machine, Mr. Pascoe?

A. I am not positive on that. I think we operated it that one season, through this haying season.

Q. When the machine was working properly, and I know you had some trouble with it, I will get to that later, but when the machine was working properly, did it do an effective job of mowing and conditioning the hay?

A. Yes, when it was working.

Q. How did the demonstration machine work when you saw it up in Tulare?

A. The day we were up there and saw it, it was real impressive. The way it was cutting. But that—it was doing a nice job up there. In fact, this machine cut the hay nice, but it just wouldn't hold up for us, and we couldn't get over the ground.

• • •

Q. You always had to fix it somehow or other?

A. Yes, we were always having trouble.

Q. What ultimately happened to the machine, when you decided that you didn't want to keep it?

A. We asked Mr. Berchtold to take it back, and he did. He took it back.

Excerpt From The Deposition Testimony (PX 20-A, p. 89) Of D. C. Heitshu (The Boss Of Petitioner's "Inventor" McCarty At The Time The "Invention" Of The Patent In Suit Was Made).

Q. Prior to the time you became Product Manager at New Holland [i.e., petitioner's farm-machinery division] had you known of any machines that had actually been marketed which served both to mow and to condition hay?

A. Yes. Bill Coultas told me about that machine [referring to the Crose machine illustrated in the *Farm Management* article, 12b *supra*].

Excerpts From The Trial Testimony Of Professor Roy Bainer.

(Tr. 34-35, 888-890, 900-904)

Q. Do you have any personal knowledge of the early art of conditioning through your own work?

A. Yes; I ran tests and published an article in Agricultural Engineering in May 1931 on this subject.

Q. Would you describe briefly the background of that work to the court?

A. Well, we mowed hay with the Cushman conditioner and a horse drawn mower and mowed it at the same time in the same field. We took randomized plots and we followed through the samples from these to treatments and determined the rate of moisture loss.

Q. And that was with what type of machine?

A. That was on a crusher-mower.

Q. Would you describe for the court generally what the nature of the crushing operation was on that machine?

A. Well, the machine had a standard cutter bar, it had a draper to carry the crop material to a pair of rubber covered rolls, both of them aggressive.

* * *

Q. Right. Now, aggressive rolls we have agreed in previous testimony were well known in this hay conditioning art, were they not?

A. That's right.

Q. So now if you start with the Crose machine, assume the Crose machine is our starting point, Mr. Bainer, if you found that it was not feeding in any given application, it was not feeding satisfactorily, wouldn't the first thing that occurred to you to be to put in aggressive rolls?

A. I had nothing to do with the development; it didn't occur apparently to Mr. Crose.

Q. Do you have any reason to think Mr. Crose wasn't satisfied with the feeding he was getting?

A. No; I don't.

Q. Now, the fact is that an agricultural engineer having the Crose machine who discovered that he had a feeding problem would, as a matter of course, turn to one

of his standard working tools, which is an aggressive faced roll; isn't that so?

A. It could be possible, yes.

Q. Well, there are textbooks, are there not, that tell the reader that cooperating rolls are more aggressive and more likely to draw a crop through between them if they are rough faced than if they are smooth faced?

A. Sure.

Q. So if this hypothetical designer who found he had a feeding problem just referred to another graduate textbook in agricultural engineering, he would learn that putting aggressive surfaces on his rolls would be one way of improving the feeding; that's so, isn't it?

A. That would be one way; yes.

Q. Now, if you talk about rotational speed in the sense of revolutions per unit time, such as revolutions per minute, it is a fact, isn't it, that the rolls turn faster than the reel in both the Crose machine and the 643 patented machine?

A. They would have to.

• • •

Q. We agreed, didn't we, when you were testifying back here a week ago that the only passage in the 643 patent that says anything at all about speed of the rolls as opposed to that of the reel is the sentence on column 6 that reads, starting at line 43:

> "Since the rotational speed of reel 145 is substantially less than that of the conditioner rolls and the sickle drive mechanism, a speed reducing drive train is provided between drive shaft 31 and reel 145."

Didn't we agree that that's the only reference to the roll speed versus the reel speed in the whole patent?

A. I thought there was some—it could be, I don't find any in these other claims yet.

Q. If you read "rotational speed" in a textbook, your straightforward and immediate inference would be that you are talking about relative angular velocity; isn't that true?

A. No; I wouldn't think so. I would think it was talking about r.p.m.

Q. And r.p.m. is relative angular velocity?

A. It could be interpreted, yes.

• • •

Q. Did you observe the operation of the Crose machine in a field of alfalfa?

A. Yes; I did.

Q. Can you describe to the court what you saw in that test?

A. Well, we had in that test the Crose, a 460 and a 480, a John Deere 480. This alfalfa was about knee high and both the 460 and the 480 had no difficulty whatever; they moved right along and never once was there any sign of plugging.

On the Crose machine there was a tendency for material to build a little ahead of the rolls. Most of the time the rolls engaged it and it went through, but if it got to a certain point then, of course, it plugged.

• • •

We tried the machine also in some rye, which was—we tried to get an average height there, which was 54 inches, I believe, and all three machines worked quite well and the interesting thing was that the previous week they'd had difficulty with the Crose in the rye—I was told they'd had difficulty in feeding. It so happened, the night before we made this test there was some rain and the rye was still wet when we went into this field and we thought that might have had some lubricating effect or why the machine apparently went along very well that particular day as compared to the week before, so we waited until afternoon and went back and continued the test and the only thing that was pointed out, and this seems ridiculous to me, was the fact that this rye had grown six or eight inches from the previous week, and that being the only difference that anyone could even think of, we raised the cutter bar about eight inches and went back in the rye

and then we had trouble with it clogging, and I can't tell you why it did it. I mean it was just one of those biological variables that we talk about in speaking about this height of material, and I still don't know why it plugged, but we had a considerable amount of plugging after we lifted that cutter bar.

Excerpts From The Trial Testimony Of Harvey L. Crose.
(Tr. 83, 87-89, 105-106, 110-111)

Q. Now, considering all of these documents, 12-A through 12-E, inclusive, how did the machines that they refer to compare in construction with the ones we saw in the photographs, Exhibits 12-H through 12-I, that you testified about a few minutes ago?

A. All of the machines were built alike, outside of very small alterations.

Q. Basically then all of these machines can be considered as the same thing?

A. The same machine.

Q. The testimony that you gave with respect to the reel and the cutter bar and the rolls and the auger, would it apply equal to all machines?

A. To all machines.

• • •

Mr. McDougall: Just a few more questions, Mr. Crose:

Q. First of all, I want to ask you about the speed of your machines; these hay conditioners you made, tell the court approximately how fast they would advance through a field of alfalfa?

A. The exact speed, miles per hour, I would estimate between five and seven miles.

Q. How did the speed of the rollers compare with the speed at which the hay was thrown back toward them by the reel?

A. The reel and the rolls run just slightly faster than the forward speed of the machine, so that when the hay was cut, that your reel and rolls were a little aggressive to the hay.

Q. Now, I understand that—maybe I'd better ask you. What my understanding is doesn't matter; what we want is the fact.

Tell the court what was the nature of the surface of the rolls on your machines?

A. The rolls was a smooth surface, the rolls were ten feet long, with an eighth-inch crown in the center.

Crose Testimony (Cont'd)

Q. Now, have you, in your previous knowledge of agricultural machinery, ever encountered a machine of any kind that had an aggressive, that is, a roll with a tread or some sort of a built-in rough surface on the roller?

A. A rough surface?

Q. Yes.

A. Yes; I've seen these rolls behind your smaller machines that was corrugated or a rough surface.

Q. Tell the court why, if you remember, that your machines were made with smooth rolls?

A. My experience with a corrugated or rough surface roll, they are a little inclined to clip the tender end off of your alfalfa hay and you go out in the field and you could rake up a whole handful of your tender alfalfa just laying on the ground going to waste; and the object of my smooth roll was to crush the hay, let it pass through; whenever the wax is broken on the alfalfa, it allowed the moisture to all leave the stem at the same time. The stem is a little inclined to draw all the moisture from the leaves to try to survive, so your leaves get dry before your stem would get dry and the object of this was to crack that wax so that your moisture would all disappear at the same time and leave your leaves on your stem.

• • •

Q. These were smooth rolls, I believe you said.

A. Smooth rolls.

Q. And they were in contact along their full width?

A. Yes, sir.

Q. When you saw the machine pointed out to you by Mr. Martin down in the Imperial Valley, did you understand that that machine was intended to work in alfalfa as it grew down in the Imperial Valley?

A. It was intended to work in alfalfa; yes.

Q. Was that also the intent of the machine which you manufactured?

A. Correct.

Crose Testimony (Cont'd)

Q. Is that the crop in which they did in fact work to your knowledge?

A. That's what the machine was designed for, was for alfalfa.

Q. And did they in fact work in alfalfa to your knowledge?

A. They did.

• • •

Q. Am I correct that in 1956 there were serial numbers 101 through 106 and those were the six machines you made in that year?

A. I believe there was one that had another number on it that belonged to a feed wagon and got on one of the machines by mistake.

Q. And that was serial number 1532 in 1958; is that correct?

A. I don't have those records and without seeing them, I wouldn't say.

Q. Will you turn over in your book of exhibits there to Exhibit 12-F. Tell us, if you can, what that document is a copy of?

A. That's a copy of the hay machines and the serial numbers that was sold.

• • •

Q. And then I will ask you the same question I asked you a moment ago: Is it true that serial numbers 101 through 106 were made in 1956 and delivered to the customers in that year?

A. '56?

Q. Yes.

A. Yes.

Q. And then there was a seventh machine, bearing serial number 1532, and that was the one that Mr. Kattenhorn got in 1958; is that correct reading of that record?

A. I would say yes.

Excerpts From The Trial Testimony Of William Roe.
(Tr. 154-155, 162-164)

Q. Now, contrast or compare, let us say, the farm land, specifically your alfalfa land, over near Shandon as compared to the land that is used for growing alfalfa in the immediate neighborhood of Fresno?

A. Was the comparison the type of soil you mean?

Q. No. I had in mind the character of the terrain, although if there is a difference in the type of soil, I would like to have you tell the court about that, too.

A. I think the difference would be there where we sprinkler irrigate. We might take in land here that you couldn't control if you flooded it, so we might go into hillsides whereas you cannot here with your flood.

Q. Do you, in fact—I won't put it in the present tense, because I understand that you have retired, but during the years that you were farming land in the Shandon area, did a substantial portion of your acreage include hillside, cultivated hillsides?

A. Probably 20 per cent.

Q. And it is a fact, is it not, the land in general over there in the area near Paso Robles is rolling as opposed to flat?

A. Yes.

• • •

Q. I notice that in both those legends and the words you just used, there is no mention of the word "conditioning". Isn't it a fact that Mr. Kattenhorn was being paid regardless of whether or not the hay was conditioned?

A. Go again with that one.

Q. I will withdraw that question and reask it rather than have it read.

These references on the back of these photographs use the expression cutter, cuts and rake, cutting machine and you told us just a moment ago that you also referred to it sometimes as a mower. My question to you is this:

Those terms do not comply with the word "condition", and I am asking you whether or not it is the fact that

Mr. Kattenhorn was paid for cutting hay whether or not he conditioned it?

A. The principle thing about that machine that we liked was his conditioner. If it isn't mentioned in these things, then it would be my kids' description of that, but the greatest thing for us there was the conditioning, the way that machine handled the hay.

Q. So you were paying him for conditioning the hay?

A. Right.

Q. And that you considered to be an advantage on the property that you were farming at that time?

A. I did.

• • •

Q. Did Mr. Kattenhorn, to your knowledge, experience any breakdowns or operating difficulties during the course of his work for you?

A. I would say he would be average with any other machine—wait a minute. He would be ahead of a lot of them and he'd be—he would be above average. Let me put it that way.

Q. So the answer is yes, he did, but the normal expectancy, is that what you are telling us?

A. He had the normal expectancy breakdowns; right.

Excerpts From The Trial Testimony Of Marion R. Kattenhorn.

(Tr. 209-213, 221-224, 254)

During this time the salesman approached me or I approached the salesman—we spent a lot of hours together—and we got to talking about the Crose hay machine, which the salesman had owned one at one time.

Q. Incidentally, tell the court the name of the salesman, if you will?

A. Del; all I remember him as is Del. I don't remember his last name.

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Q. Go ahead.

A. While I was doing the drafting on this portable pellet machine, we also designed other machines. I designed an ensilage loader; I designed a bermuda grass digging machine. Those are the three main ones. We drew up a few barns and I'd always wanted to work in the hayfields, so I thought, well, this is the beginning where I can start. So I got the financing fixed up so I could buy a Crose hay machine.

Q. I would like at this point to break in, because I think we've come to the point where we will want to fill in the story with some more details.

First, let's jump over the situation very quickly to bring it down to date. Now, did you in fact go to work in the hayfields with this machine?

A. Yes; I did.

Q. And how long did you continue in that work?

A. I worked from 1958, May 1958 to August 1963.

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Q. Throughout that entire period, however, you did go on mowing Mr. Roe's fields, did you?

A. Yes; I did.

Q. How much land did Mr. Roe have in hay?

A. The first two or three years I was with him, he had about—well, it ranged from 600 to 700 acres. He was renting land from Sinton Company and then Sinton traded the land to Kern County Land Company; however, we still mowed that same property and what wasn't

in beets or other crops was put into alfalfa hay, and that's the land that I mowed for Mr. Roe, the hay I mowed for him, and the last two years, or maybe it's three years, he increased his acreage up to about 1200 acres, 1100 to 1200 acres, because we took in the Canyon Ranch and we gradually got a lot more hay.

Q. And this additional land, was that also mowed by you?

A. Yes; it was.

Q. What was your experience, and I'm not just asking for something theoretical now, I want to know about what you actually during this period, what was the number of cuttings per season of alfalfa hay in the Shandon area?

A. We mowed nearly everything four times; however, if the weather permitted, there was, I think, a couple of years we mowed clear up to within a week of Thanksgiving, which gave us another cutting. The hay wasn't very tall, but he wanted it mowed, so I mowed it, but nearly everything was mowed four times and quite a bit of it we got a fifth cutting.

Q. Now, tell the court what is the fact as to whether this cutting was done, that you just testified about, with the machine you bought from Mr. Crose?

A. I cut the first three or four years with this machine entirely and then one year I employed—I bought a Ford major tractor and I bought a seven-foot mower to go on behind. The first cutting that year I mowed part of it with the tractor because I hired a boy to run the tractor and I run my machine.

Q. So you had both machines going at the same time?

A. Only for the first cutting, and I could outmow him with my machine so therefore I didn't continue with the tractor.

Q. So what is the fact then with respect to the last year?

A. The last year he bought another machine, he bought a New Holland machine.

Q. Who is "he"?

A. Bill Roe.

Kattenhorn Testimony (Cont'd)

Q. O.K. Go ahead.

A. And he told me, he says, "You have first choice at the hay; what you don't mow, I'll follow behind with the other mower."

Q. And is that the way it worked out in fact?

A. Yes; it was.

Q. Now, your machine, you said it was used over this whole span of five years, did you ever run into maintenance problems with it; did you have any breakdowns?

A. Hay machinery will constantly give you breakdowns and there was always bearings to replace, I replaced the rollers, I replaced tires, I replaced the reel.

Q. Now, these operations you are speaking of, when you said hay machinery will break down, were you talking about your machine or hay machinery in general?

A. Well, hay machinery in general will break down; the machinery that I've run over the period of my life, I've always found that true.

Q. How would you say this Crose machine, the machine which you used which you bought from Mr. Crose, how did that stack up compared to other hay machinery you are familiar with from the point of view of maintenance; in other words, was it about average, a little better than average or worse than average?

A. It was about average.

Q. Did you ever run into any problems with it that you weren't able to repair by appropriate substitution of new parts or whatever happened to be involved?

A. No. If I needed new rollers, I'd come to Mr. Crose; if I needed bearings, I'd either go to him or the local dealer; if I needed tires, we use war surplus tires, I'd go to a war surplus tire shop and get the tires.

• • •

Q. Did this machine occasionally plug up with hay, the alfalfa which you were cutting?

A. In clean alfalfa there's no plug up.

Q. It never plugged?

A. In clean alfalfa; I mean no gopher mounds, no badger mounds, no aphid, no tumbleweeds, no foreign matter. In clean alfalfa it run beautiful.

Excerpts From The Trial Testimony Of Professor Louis J. Powers.

(Tr. 618)

Q. All right. Now, what I'm asking you is—by the way, let's get the colors straight. You have already said that the red was the 643 patent construction. What is the blue?

A. The blue is the Crose machine.

Q. And the black?

A. The Deere 480.

Q. And from the point of view of the orientation with respect to the sickle bar and the reel, is the John Deere machine construction closer to that of the 643 patent or that of the Crose machine?

A. The guiding plate of the Crose machine and that of the John Deere machine are almost identical in location and position.

Q. They both differ then, do they, from that of the 643?

A. They both differ and are below that of the 643.

Excerpt From The Trial Testimony Of Emmett F. Glass (An Assistant Of H. D. McCarty, Petitioner's "Inventor").

(Tr. 453-456)

Q. Mr. Glass, in connection with Exhibit 83—that's the tabulation of dimensions of the Deere machine and the New Holland machine—isn't it the fact, to your knowledge, that farm machinery manufacturers normally, for a given application, that is, a given type of machine, will sell machines of substantially the same dimensions? In other words, are there other machines you can think of in your line that have counterparts of substantially the same size in the International and the Deere and the Hesston lines or products?

A. I would say that they would not be exactly the same.

Q. Well, these are not exactly the same either, are they?

A. Some of the dimensions are not exactly the same, right.

Q. And some of the dimensions will be exactly the same—pick any machine in your line, you have competitors that are making a machine of substantially the same size, aren't you; isn't that so?

A. Close to it; yes.

Q. Have you ever had occasion in connection with buying a car, or otherwise, to make size comparisons among the various standard four-door sedans, for example?

A. Yes.

Q. And the fact of the matter is that a Galaxy 500 that is made by Ford corresponds within very, very small measure of difference to the size of the four-door sedan made by Chevrolet and Plymouth has one that is about the same size once again, doesn't it?

A. Yes.

Q. I notice on this list that one of the things that is noted as being an identity between the two machines

is the knife speed. Is 700 cycles per minute a conventional speed for a cutter knife in a mowing machine?

A. I know some knife speeds have been a lot higher than this, up around 1100.

Q. Well, you're not suggesting, at any rate, that the selection of 700 cycles per minute was some sort of an original contribution by New Holland, are you?

A. We were basing this knife speed, I believe, on the speeds that we had been using on our mowers; we based it on experience with that.

Q. Would it surprise you any to learn that Deere selected the knife speed it used for the same reason?

A. It's possible.

Q. Now, I notice in respect to the reel and rolls speed that Mr. Mayer asked you several questions near the end of your direct examination about the Crose machine and do I infer from that—am I correct in inferring that you consider the reel speed and the rolls speed are factors that you consider to be of some importance in the operation of a mower-conditioner?

A. Yes.

Q. Now, I observe that in case of the reel speed in the Haybine it ranges between 42.9 and 70 revolutions per minute, whereas in the Deere machine the range is 58 to 68; that's not identical, is it?

A. No; it isn't.

Q. And on the rolls speed there is a radical difference, indeed, in the speeds of the two rolls, that is, the speeds of the rolls in the two machines; correct?

A. Well, the speeds are different, but I think the peripheral speed is the more important thing.

Q. The fact is that Deere uses rolls of like size in its machine, doesn't it?

A. No; they don't use the same rolls we use.

Q. I beg your pardon?

A. Deere doesn't use the same type of rolls that we use.

Glass Testimony (Cont'd)

Q. That's right. I appreciate your mentioning that; that was going to be my next question.

And they are not only different in type from those which are used by New Holland, but they differ also in that the Deere rolls are the same size, aren't they, whereas the upper roll of the Haybine machine has a different diameter than the lower roll?

A. Yes.

Q. And you mentioned the fact that you considered the peripheral speed of the rolls to be more important than that of the actual revolutions per minute; even in the field of peripheral speed there's a big difference between the Deere and the Haybine, isn't there?

A. Not a big difference.

Q. Well, don't you think there's a substantial difference between 12 miles per hour and 16?

A. There's a difference, but I'm not sure you can consider—

Q. In all events, you are not suggesting that Deere arrived at the speed of 16.6 miles per hour by copying anything the Haybine did, are you?

A. No; I'm not saying that.

Excerpts From The Trial Testimony Of Horace D. McCarty.
(Tr. 850-852, 872-873, 881-885)

Q. Mr. McCarty, have you seen at New Holland a Crose machine similar to the machine that is marked here in evidence?

A. At New Holland?

Q. At New Holland.

A. Yes; I have.

Q. Do you know when that machine was obtained or purchased?

A. In the summer of '69.

Q. Do you know who it was purchased from?

A. Mr. Martin, Orville Martin in the Imperial Valley.

Q. Have you carefully compared the machine at New Holland and the Crose machine in evidence?

A. Yes; we have.

Q. What did you find; are the same or different?

A. They are essentially the same.

• • •

Q. What is the condition of the Crose machine at New Holland, what is its physical condition?

A. It's now in runnable condition.

Q. What steps in general were taken in order to get it into operable or runnable condition?

A. As I remember, we had to rebuild one of the lift cylinders, replace the fan belt, the water pump; the drive tires were replaced.

Q. Are they the two big tires?

A. They are.

Q. Were any structural changes made in the machine?

A. No; there were not.

Q. Have you seen the Crose machine at New Holland operated in a field of alfalfa?

A. Yes; I have.

• • •

Q. You don't get any stripping unless there is enough crop material to bridge the gap between the tines and the rolls?

A. That's correct.

Q. And that the rolls have once gripped this mat in the bite so that they are drawing it through, then thereafter the stripping of the tines take place just automatically because the mat peels off the tines and goes through the rolls, doesn't it?

A. If the aggressive surface of the upper roll contacts the material it has the stripping action. If it were clamped in the rolls, as you describe, that would also help to strip.

Q. As a matter of fact, in the Crose machine, that is precisely what happened after enough material built up to provide that bridging between the tine tips and the rolls, isn't it?

A. When I observed the machine, that's right.

* * *

Q. Now, in your testimony that you found in this entire specification a teaching of attenuation achieved by —you told the court, didn't you, that this attenuation was achieved by having the rolls turning more rapidly than the crop was moving up the ramp; how did you phrase it, I don't remember your exact words? Will you tell the court what degree of roll speed it is that confers attenuation or results in attenuation?

A. Well, I don't remember my exact words either, but what I said was that the reel turns faster than ground speed by the fact that the description says it lifts and rakes the crop across the bar. This would indicate to me that it is going faster.

Then it says that the rotational speed of the rolls is faster than the reel and as I look at the drawings and look at those two statements, it teaches me that you get this attenuating action.

Q. In the first place, that reading of the patent requires you, does it not, to take the words "rotational speed" in respect to the rolls and the reel, and I am referring to column 6 starting at line 43 where that one sentence appears that relates to the speed of the reel

and the rolls, in order to support this interpretation that you have just submitted to the court, you have to read "rotational speed" as meaning peripheral linear speed, don't you?

A. Meaning feeding speed or peripheral speed, yes, sir.

Q. If you wanted to describe the speed of the reel as compared to the speed of the rolls in terms of revolutions per minute, wouldn't you say rotational speed?

A. That or r.p.m., yes.

Q. Now, you did testify, as I recall it, that the Crose machine, that in the Crose machine when you saw it operating the reel did rake the crop up the ramp, didn't it?

A. Yes.

Q. And the rolls, in turn, picked it up and carried it through and dropped it behind the machine?

A. Yes.

Q. You did say this was done a great deal more slowly than it is done in the Haybine machine?

A. That's correct.

Q. But it is a fact, isn't it, that the reel had to be turning faster than the advance speed of the machine over the ground or you wouldn't have gotten this raking action that you were talking about?

A. Well, yes and no; it would have raked it across the cutter bar, but it would not have had a lifting action on the crop forward of the cutter bar and I didn't observe that. I'm not saying it didn't happen; I just don't remember if it did it.

Q. Now, you were reading into the text of your patent a reel speed greater than the speed of advance of the machine over the ground from the statement near the bottom of column 6 that the reel rakes the crop across the cutter bar; isn't that true?

A. Yes.

Q. So if that statement is true of the 643 machine it's also true of the Crose machine, isn't it?

A. Well, it rakes it over the cutter bar; that's true.

• • •

McCarty Testimony (Cont'd)

Q. Now, are you drawing a distinction in your testimony to the court about what reel speed is indicated by raking action in the 643 machine as compared to the Crose machine?

A. No; I'm not.

Q. So you would agree that anything, that any reel action that was fast enough in your judgment to achieve raking in the 643 machine would indicate that the reel speed was greater than the advance speed of the machine?

A. Yes.

Q. And the same thing is true of the Crose machine, isn't it?

A. Yes.

• • •

Q. Now, in respect to the roll speed then on the Crose machine we can agree, can we not, that the rotational speed of those rolls in the r.p.m. sense is faster than the rotational speed in the r.p.m. sense of the reel?

A. Yes.

REPLY

BRIEF

Supreme Court, U. S.
FILED
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IN THE

Supreme Court of the United States

OCTOBER TERM, 1975

No. 75-310

SPERRY RAND CORPORATION,

Petitioner,

—v.—

DEERE & COMPANY,

Respondent.

ON PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE NINTH CIRCUIT

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October, 1975

IN THE

Supreme Court of the United States

OCTOBER TERM, 1975

No. 75-310

SPERRY RAND CORPORATION,

Petitioner,

—v.—

DEERE & COMPANY,

Respondent.

ON PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE NINTH CIRCUIT

REPLY BRIEF FOR PETITIONER

1. After an attempt, which we will touch on later (pp. 6-10 below), to present this case to this Court on the basis of facts other than those on which the Court of Appeals decided it, the Respondent joins us in our position as to what basic legal question is presented by this case. That question is whether the "new and surprising results" test of the *A&P* case in 1950 survived the enactment of Section 103 of the Patent Act and this Court's decision in *Graham* v. *John Deere Co.*, 383 U.S. 1, and the cases decided with *Graham* in 1966 by this Court. See Br. Op. 12-16. It is Respondent's position that this Court's decision in *Anderson's-Black Rock, Inc.* v. *Pavement Salvage Co., Inc.*, 396 U.S. 57 (1969), teaches that the test laid down in the *A&P* case for the validity of a mechanical combination patent—and applied by the Ninth Circuit to void the "Haybine" patent—in fact survived Section 103 and the *Graham* decision. (Br. Op. 13-14)

Thus, it is Respondent's position that in the case of a combination patent—and virtually every patent in the mechanical arts is a combination patent—two tests must be met for patent validity: *first*, the requirement that the combination, as the Ninth Circuit held, "must result in new and surprising consequences and not merely produce a result consistent with the expected operation of the sum of the constituent elements" (Pet. App. 3a), and only then, *second*, the "obviousness" test, namely, is the making of the combination—the particular putting together of old elements, as the elements in the mechanical arts all are—an obvious one.

The issue thus squarely framed by the Petition and the Brief in Opposition is whether the "new and surprising results" test has survived with the "obviousness" test taught by *Graham*. Respondent says it has—Petitioner says that it has not. The competing arguments are representative of the division in authority that has produced such dramatically different results in the various Courts of Appeals, and which should be resolved by this Court.

We would observe that although Respondent presents the tests as two separate tests, each of which must be met, the practical effect of Respondent's position is that there would only be one test—the "new and surprising consequences" test enunciated by the Ninth Circuit below.[1] It is that test—which, as we set forth in the Petition (Pet. 24-27), would

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[1] While Respondent's test is presented as having two aspects (Br. 14-15), the truth is that if a mechanical combination actually resulted in "new and surprising consequences" and did not "merely produce a result consistent with the expected operation of the sum of the constituent elements," as that language is used by the Ninth Circuit, that is, create physical results not implicit in the mechanical elements themselves (assuming somehow that this could be done), the result would be certainly "nonobvious." Thus, the "new and surprising results" test would completely supersede the "obviousness-nonobviousness" test. If Respondent is right, one wonders why this Court spent so many pages in the *Graham-Calmar-Adams* trilogy in 1966 expounding the "obviousness-nonobviousness" test.

invalidate virtually every patent in the mechanical field—that we contend did not survive the *Graham* case, being superseded by the test of "obviousness" taught by the *Graham* case.[2]

We set forth in the Petition our interpretation of the *Anderson's-Black Rock* case and our position that the *Graham* test of "obviousness-nonobviousness" is the touchstone as to whether an invention exists, whether in the mechanical or in the electrical or chemical fields. After the enactment of Section 103, the "obviousness-nonobviousness" test is the standard of invention, not merely an "additional" test to supplement the *A&P* requirements. Section 103 of the Patent Act of 1952 was designed to harmonize the decisions through the "obviousness-nonobviousness" standard. It was not designed to codify the *A&P* test, but to supersede it. Pet. 20-23.

Indeed, one of the infringers' counsel in the *Graham-Calmar-Adams* trilogy contended that the Constitution mandated the old *A&P* test for a combination mechanical patent, whatever was the rule as to other types of patents.[3] But this contention, now reiterated by Respondent, was not accepted by the Court in *Graham*, which applied the test of "obviousness" to the combination involved in the *Calmar* case. See 383 U.S., at 30-37.

There is no support whatsoever in *Graham* for the special test contended for by Respondent as to mechanical combination patents. The opinion in *Graham* and the related cases may be searched in vain for any reference to the "new and surprising results" test. And in the

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[2] Respondent suggests (Br. Op. 12) that we are urging that "mere aggregations of old elements are now patentable." But clearly the "obviousness-nonobviousness" test precludes the patenting of "mere aggregations," which is the bringing together of old elements in cases where the combination is obvious and thus no invention is involved.

[3] See Br. for Pet'r, *Calmar, Inc.* v. *Cook Chemical Co.*, No. 37, O.T. 1965, pp. 22-27.

Anderson's-Black Rock case this Court expressly applied the "obvious-nonobvious" standard to the making of a combination; it struck down the patent there involved, stating that "we conclude that the combination was reasonably obvious to one with ordinary skill in the art." 396 U.S., at 60. The *Anderson's-Black Rock* opinion's sole reference to the *A&P* case was to a general, noncontroversial principle taught by that case and not to its "new and surprising results" language. *Id.*, at 61. It should be noted that, in the *Graham* case itself, the Court of Appeals for the Eighth Circuit, whose judgment was reviewed in *Graham*, had applied the "new and surprising results" test (333 F.2d 529, 533-34); but this Court, in affirming its judgment, noted that it had "determined that neither [the Eighth nor, in an earlier decision, the Fifth] Circuit applied the correct test." 383 U.S., at 4.

The critical point is that the Respondent admits that, for the legal position of the Ninth Circuit below to be correct, the "new and surprising results" test of the *A&P* case has to survive the *Graham* decision and the enactment of the Patent Act of 1952. (Br. Op. 12-16) Such a legal proposition obviously presents an important issue of law which should be resolved by this Court. The Ninth Circuit's and the Respondent's proposition certainly conflicts with decisions in other circuits which have enunciated the test as whether "the *bringing together* of these elements [in combination patents] would have been obvious," *Shaw* v. *E.B. & A.C. Whiting Co.*, 417 F.2d 1097, 1104-05 (2d Cir. 1969), *cert. denied*, 397 U.S. 1076 (1970) (emphasis original), that is, solely the obviousness-nonobviousness test of *Graham*.[4] Clearly, this issue is one which should be resolved by this Court.[5]

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[4] As to the suggestion by Respondent that the Tenth and District of Columbia Circuits embrace the same test as that of the Ninth Circuit (Br. Op. 16), we refer the Court to our discussion in Pet. 15 n. 11.

(*footnote 5 appears on following page*)

This case is one which presents that question very squarely; and it is hardly a "routine one." (Br. Op. 1) This case was originally argued in July 1973 before a panel of the Ninth Circuit, with Petitioner then making the point that the basic current of authority in the Ninth Circuit applying the "new and surprising results" test, as exemplified by decisions such as *Regimbal* v. *Scymansky*, 444 F.2d 333 (9th Cir. 1971) and other cases cited at Pet. 15 n. 12, were contrary to a "maverick," but we contend correct, Ninth Circuit decision, *Reeves Instrument Corp.* v. *Beckman Instruments, Inc.*, 444 F.2d 263, *cert. denied*, 404 U.S. 951 (1971).—In *Reeves*, a panel of the Ninth Cir-

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[5] Respondent suggests that the *AdP* standard of "new and surprising results" is one dictated by the Constitution. If that were the case, it is surprising that this Court overlooked reiterating it in the *Graham* case, where it analyzed three separate patents in its most thoroughgoing analysis of the standard of invention in the past generation. The constitutional standard, however, is one which grants the patent monopoly to "Inventors" whose inventions "promote the Progress of Science and useful Arts." Art. I, Section 8, Clause 8. The precise judicial phrasing of what constitutes an "invention" has varied over the years, but, as the Court taught in the *Graham* case, the basic question is a functional one involving a "comparison between the subject matter of the patent, or patent application, and the background skill of the calling." 383 U.S., at 12. It is to that analysis that the test of "obviousness-nonobviousness" as set forth in Section 103 is related; the "new and surprising results" test is completely foreign to it. The suggestion by Respondent that this case has constitutional dimensions is itself indicative of the need for this Court's review.

Respondent points to the language in *Graham* (383 U.S., at 17) that the Section 103 test of obviousness is an "additional condition," suggesting that it is additional to the "new and surprising results" test. (Br. Op. 14-15) The *Graham* decision of course says nothing of the kind. The other two tests referred to in the *Graham* opinion at page 17 are the tests referred to in Sections 101 and 102 of the Act, including the test of Section 101 that "[W]hoever invents or discovers any new and useful process, machine, manufacture or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor . . . ." Obviously, the "Haybine" was "new and useful"; the only litigated question here was whether it met the conditions for patentability set forth in Section 103.

cuit had upheld a combination patent under the "obviousness" standard, observing that the requirement of "new and surprising results" from a patented combination "precludes the patenting of virtually any mechanical or electrical device since the vast majority, if not all, involve the construction of some new device (or machine or combination) from old elements." *Id.*, at 276.[6]—After the July 1973 oral argument, the Ninth Circuit *sua sponte* took the case *en banc* in February 1974, in a vote kept secret until later. Six months later, the vote to consider the case *en banc* was rescinded, a judge of the original panel recused himself, a new panel was constituted, and the case was reargued orally before the new panel in December 1974. See the Appendix to this Brief, p. 1a, below. It was only after this agonizing decisional process in the Ninth Circuit that the decision in this allegedly "routine" case emerged in March 1975, close to two years after its original argument.

This is not a routine case. It is a case which on the law obviously gave the Ninth Circuit great difficulty before it reiterated its "new and surprising results" tests derived from *A&P*. It is an ideal case for this Court to resolve the basic question of law jointly identified by the parties.

2. Respondent's frank avowal of the important issue of law presented by this case is preceded (Br. Op. 3-9) by an underbrush of factual contentions in an apparent effort to divert this Court from reviewing this case. But none

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[6] The *Reeves* decision, in an attempt to reconcile its holding with the major—and we submit erroneous—current of authority in the Ninth Circuit, cited the *A&P* case and viewed it as a special application of the "obviousness-nonobviousness" test. It pointed out that this Court's decision in the *Anderson's-Black Rock* case "supports this interpretation of the *A&P* decision." 444 F.2d, at 271.

The court pointed out that, under the "new and surprising results" test, "There is doubt that anything would be patentable." It observed that the "new and surprising results test," if logically applied, would make all inventions unpatentable "because they amount to no more than a discovery of something which already existed in nature." *Id.*, at 270-71 n. 4.

of the factual points raised by Respondent is any obstacle to this Court's review.

(a) Respondent claims that the prior-art Crose machine was "highly successful" and that the "Haybine" differed from it "only in pedestrian, obvious ways." (Br. Op. 3) We begin by observing that it is strange that under these circumstances the Deere engineers, who had seen the Crose machine years before the "Haybine" was invented (Tr. 822, 838-40), copied it neither at that time nor later. Rather, as their extraordinary 1966 memorandum quoted at Pet. 12 indicates, they chose to copy the "Haybine."

The reason was, as the Court of Appeals held, that "[T]hese prior machines were subject to frequent plugging when cut hay would pile up in front of the conditioning rolls and, consequently, were not widely used." (Pet. 2a) As the Court of Appeals also held, the "Haybine" "solved the plugging problem." *Ibid.* The result was that, while Crose sold six or seven of his machines, New Holland sold tens of thousands of the "Haybine." The highly selective testimony quoted by Respondent (Br. Op. 6-7) simply shows that there were occasions on which the Crose ma-machines did not plug. The record contains ample evidence that on numerous occasions the Crose machines were subject to plugging (PX 16-B, pp. 8-9; Tr. 110-13) which accounted for their use being confined to a few machines cutting hay for a few years in a few locations in California. (PX 16-A, 16-B, and 16-C) The Crose machines were a forgotten failure, rediscovered by Deere's counsel in an effort to find "enough prior art to help" as pleaded for by Deere's chief engineer in the 1966 memorandum.

(b) Respondent, at Br. Op. 8-9, engages in an obscurantist attempt to suggest that the nub of the "Haybine" invention is "attenuation" and to make some sort of

point from the fact that the word "attenuation" is never used in the patent. This is essentially a verbal quibble which was anticipated in Pet. 9 n. 5. The "Haybine" patent teaches the design of the "Haybine" machine and shows a mechanism which inherently attenuates the flow of the cut crop material and is capable of operation as a practical mower-conditioner for all sorts of hay crops.

(c) Respondent says that "neither petitioner's 'Haybine' machine nor the idea of mowing and conditioning hay in a single pass" was new. (Br. Op. 7) But that is as irrelevant as saying that the Wright brothers were not the first to think of a heavier-than-air flying machine, since the idea was already old by the time of Leonardo da Vinci. The fact of the matter is, however, that the "Haybine" was the first machine successfully and practically to be capable of "mowing and conditioning hay in a single pass," just as the Wright brothers' machine was the first machine successfully and practically to achieve heavier-than-air flight. The earlier machines did not work. It is one thing to have the idea of mowing and conditioning hay in a single pass; it is quite another to invent a machine that will do it—as to all forage crops, and without "plugging."

(d) Respondent suggests that the "Haybine" was found below to be an "obvious modification" of the Crose machine. (Br. Op. 7) But Respondent's counsel, in his opening statement in this case, stated that "in the first place, we are really not dealing with obviousness here, Your Honor; it doesn't enter into the case." (Tr. 18) And, as detailed in the Petition (Pet. 17 and Pet. 25 n. 19), the lower courts did not find that the "Haybine" was an "obvious" combination of the prior-art elements. They simply found—as is undisputed—that the physical elements used in the "Haybine" were standard mechanical elements and that the machine was composed of them. But the combina-

tion was completely unobvious, as the evidentiary tests reviewed at Pet. 26 n. 20 demonstrate. If making this particular combination was "obvious," as Respondent now appears to suggest, one wonders why the Deere engineers were confused as to where to put the "aggressive" upper roll; at first they put it on the bottom rather than the top, it not being "obvious" to them that it had to be on the top in order for the machine to work. As Respondent somewhat delicately points out: "the roll reversal in respondent's second model resulted from *field experience.*" (Br. Op. 11; emphasis original) The "field experience" was that the first model was beset by plugging problems. (DX 80, pp. 226, 344-45)

It is important to note what the Crose machine was not—apart from the fact that it was not a workable machine. It had no aggressive upper roll or, indeed, any aggressive roll; it was built on the "wringer-washer" principle. Its reel was not close to the rolls, and its reel tines were not controlled to deliver the cut crop material directly into the rolls. It did not have a rough-surfaced upper roll slightly ahead of the lower roll to strip the cut crop from the reel. It never had a roll speed that was faster than the reel speed and related to it so as to aid in stripping the reel. As the Court of Appeals found (Pet. 2a), the employment of these elements in the "Haybine" "solved the plugging problem."

These elements—although, to be sure, chosen from the staple elements of the mechanical arts, but put together in a completely unobvious way—made the "Haybine" what it is—a brand-new type of farm machinery, selling tens of thousands each year. The Crose machine did not have the elements which made the "Haybine" an operational success; its life span was limited to a few years when a few machines were unsuccessfully used in a few places in

California. As one court trenchantly once put it: "Patents for useful inventions ought not to be invalidated and held for naught because of . . . excursions into the boneyard of failures and abandoned experiments." *Reynolds* v. *Whittin Machine Works, Inc.*, 167 F.2d 78, 84 (4th Cir. 1948).

This Court thus can and should reach the important issue of law identified by both parties in this case, and review the decision below which establishes an incorrect and inherently impossible standard for the patenting of mechanical inventions.

CONCLUSION

For the reasons stated in the Petition and herein, the Petition for Certiorari should be granted.

Respectfully submitted,

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APPENDIX

Order Regarding En Banc Consideration

UNITED STATES COURT OF APPEALS

FOR THE NINTH CIRCUIT

FILED AUG. 26, 1974

CLERK, U. S. COURT OF APPEALS

No. 71-1897

DC # 7306 Civ.

DEERE & COMPANY,

Plaintiff-Appellee,

—v.—

SPERRY RAND CORPORATION,

Defendant-Appellant.

APPEAL FROM THE UNITED STATES DISTRICT COURT FOR THE EASTERN DISTRICT OF CALIFORNIA

Before: CHAMBERS, MERRILL, KOELSCH, BROWNING, DUNIWAY, ELY, HUFSTEDLER, WRIGHT, TRASK, CHOY, GOODWIN, WALLACE, and SNEED, *Circuit Judges.*

By vote of the court taken February 28, 1974, this case was withdrawn from the panel of Judges Merrill, Trask, and Kelleher, and taken en banc. Judge Merrill has now recused himself from consideration of this case.

No order of this court taking this case en banc has been filed. The vote is rescinded and the cause is returned for disposition to a panel consisting of the two remaining judges on the original panel and a third judge whose name shall be selected by lot by the Clerk of the court.

For the Court:

RICHARD H. CHAMBERS
United States Circuit Judge